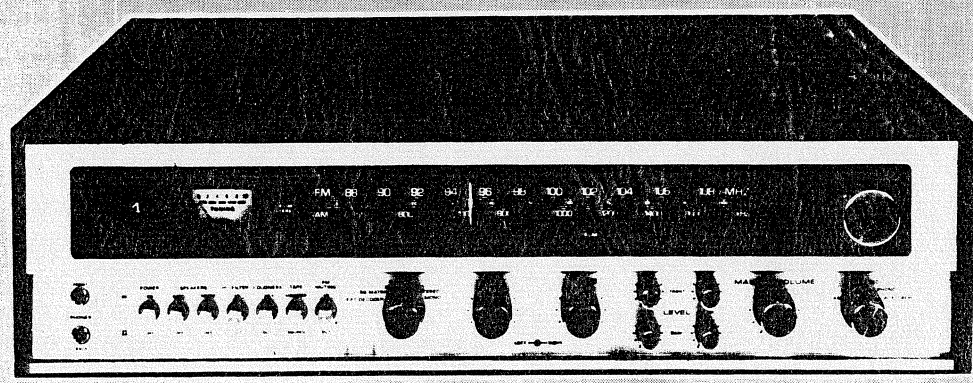
ROTEL®

RX-454

4 CHANNEL STEREO RECEIVER



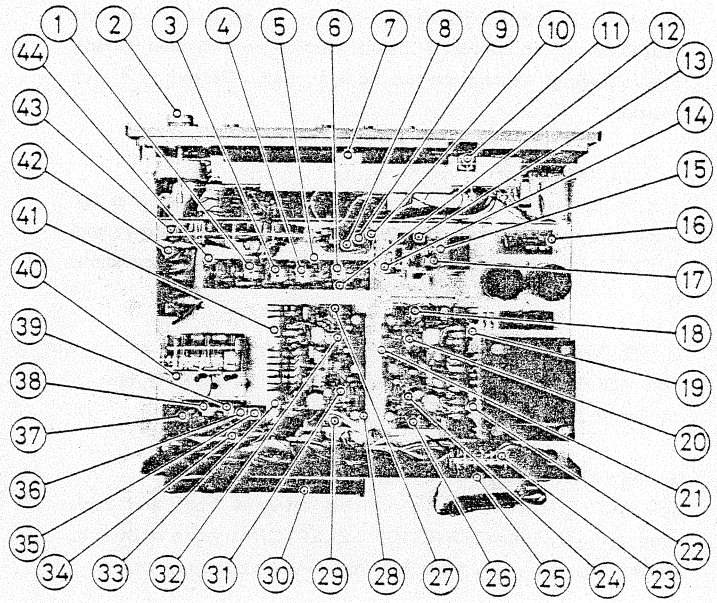
technical manual

TABLE OF CONTENTS

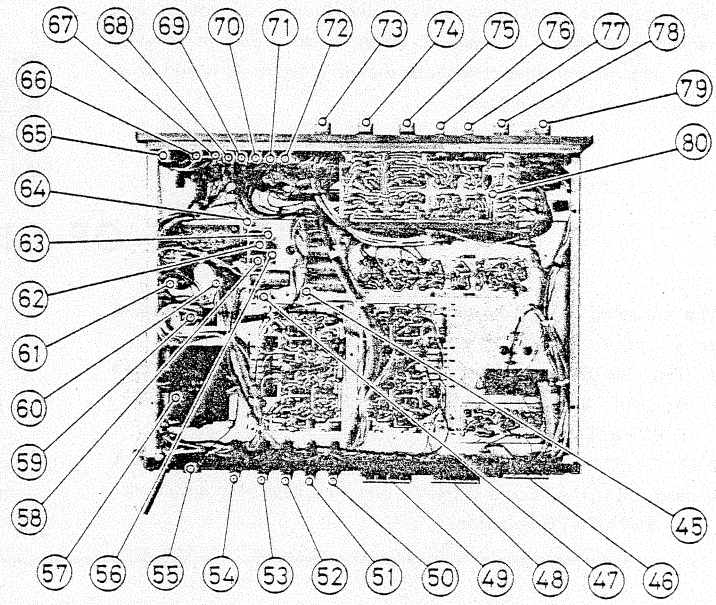
CHASSIS LAYOUT 2
GENERAL 3
SPEAKER CONNECTION 3
NOTICE OF CHANGES 3
PRECAUTIONS 4
BIAS (IDLING CURRENT) ADJUSTMENT 4
AM ALIGNMENT PROCEDURE 5
FM IF & RF ALIGNMENT PROCEDURE 6
FM-STEREO (MPX) ALIGNMENT PROCEDURE 7
FM MONO-STEREO AUTOMATIC SWITCHING LEVEL ADJUSTMENT PROCEDURE 8
MUTING ALIGNMENT PROCEDURE 8
SQ MATRIX DECODER CHECKING METHOD 9
GAIN DIAGRAM 9
TROUBLE SHOOTING 10
TONE CONTROL AMPLIFIER CIRCUIT BOARD 11
MAIN AMPLIFIER CIRCUIT BOARD 12
QUAD-STEREO SWITCH CIRCUIT BOARD 12
SQ MATRIX 4-CHANNEL DECODER CIRCUIT BOARD 13
FM IF AMPLIFIER CIRCUIT BOARD 14
DISTRIBUTING CIRCUIT BOARD 14
FM MPX DECODER CIRCUIT BOARD 15
4-CHANNEL INDICATOR CIRCUIT BOARD 15
EQUALIZER AMPLIFIER CIRCUIT BOARD 16
QUAD-STEREO SWITCH CIRCUIT BOARD 16
RECTIFIER CIRCUIT BOARD 17
FM MUTING CIRCUIT BOARD 17
DERIVED CIRCUIT BOARD 17
DIAL STRINGING & FRONTEND SCHEMATIC DIAGRAMS 18
SCHEMATIC DIAGRAMS 19
PARTS LIST 28

ROTEL

CHASSIS LAYOUT



1. T101, FM IFT 2nd
2. Tuning Knob
3. T102, FM IFT 3rd
4. T103, FM IFT 4th
5. VR102, FM meter level adj.
6. T104, FM IFT Ratio Det.
7. Dial pointer
8. VR801, Muting level adj.
9. L801, Muting coil
10. FM Muting pcb
11. FM Stereo Indicator
12. VR101, FM auto-switch level adj.
13. L301, MPX coil
14. VR301, MPX separation adj.
15. MPX decoder pcb
16. 4-ch. Indicator pcb
17. S 10, De-emphasis switch
18. VR603, L-ch. Back DC balance adj.
19. Power Amp. Left channel Back
20. VR604, L-ch. Back Idling current adj.
21. Main amp. pcb L-ch.
22. Power Amp. Left channel Front
23. Quad switch pcb
24. VR602, L-ch. Front Idling current adj.
25. S5, Quad switch
26. VR601, L-ch. Front DC balance adj.
27. VR601, R-ch. Front DC balance adj.
28. Main Amp. pcb R-ch.
29. VR603, R-ch. Back DC balance adj.
30. L002, AM antenna coil
31. VR604, R-ch. Back Idling current adj.
32. VR602, R-ch. Front Idling current adj.
33. Power Amp. Right channel Back
34. AM conv. and IF amp. pcb
35. L201, AM osc coil
36. T201, AM IFT 1st
37. T204, AM IFT Det.
38. T203, AM IFT 3rd
39. T202, AM IFT 2nd
40. AM/FM Front end
41. Power Amp. Right channel
42. Equalizer Amp. pcb
43. SQ Matrix Decoder pcb
44. FM IF Amp. pcb



45. Distributing pcb
46. Antenna terminal strip
47. Q904, Stabilizer transistor
48. Front speaker terminals
49. Back speaker terminals
50. F004, R-ch. Front fuse
51. F002, L-ch. Front fuse
52. F005, R-ch. Back fuse
53. F003, L-ch. Back fuse
54. F001, AC fuse
55. AC Outlet
56. D905, Rectifier
57. T001, Power Transformer
58. D906, Rectifier
59. Voltage selector
60. C006, Ripple filter
61. C005, Ripple filter
62. D904, Rectifier
63. D903, Rectifier
64. Rectifier pcb
65. Headphones jack
66. S1, Power switch
67. S7, Back speaker switch
68. S6, Front speaker switch
69. S4, High filter switch
70. S3, Loudness switch
71. S2, Tape Monitor switch
72. S11, FM Muting switch
73. S9, Mode switch
74. Bass control
75. Treble control
76. Level control Left channel
77. Level control Right channel
78. Master Volume control
79. S8, Function selector switch
80. Tone control amp. pcb

GENERAL

RX-454 contains the function of 4-channel operation in addition to AM & FM STEREO tuner amplifier. In general operate the MODO switch to convert 2-channel (Stereo) to 4-channel (Quad). The followings explain the functions of the MODE switch in each position.

1. EXT DECODER
The MODE switch in this position activates the channels as full 4-channel amplifier, receiving the external 40channel source signal at EXT DECODER terminal. Each channel operates independently.

2. SQ DECODER
The MODE switch in this position activates SQ matrix circuit to convert 2-channel to 4-channel.

3. 4-CHANNEL DECODER
The MODE switch in this position activates front and back channels, only when FUNCTION SELECTOR is set to AUX/4ch. Unless otherwise, only front 2-channels will be put on work.

For monitoring the tape all 4-channels will be put on work by setting the MONITOR switch to MONITOR position regardless of a position of FUNCTION SELECTOR.

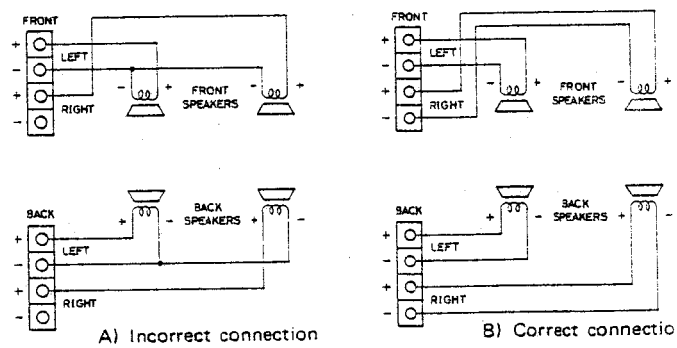
4. STEREO
The MODE switch in STEREO position activates front channels only, because of the open back channel.

5. MONO
The MODE switch in MONO position activates front channels only, because of the open back channel.

When servicing the MODE switch in STEREO position front and back channels on the main amplifier will play stereo under BTL connection and the power will be doubled by placing the QUAD-STEREO switch on the rear panel to STEREO.
Since the faulty connection of the speaker systems causes an unexpected trouble, make sure to follow the instruction described below. In case of trouble check to see if the speakers are properly connected.

SPEAKER CONNECTION

This model is equipped with QUAD-STEREO changeover switch in the output circuit. The output circuit is designed to turn into BTL connection with MODE switch in STEREO position.
Hence when connecting the speakers to the output terminals each lead must be connected individually to the designated lead terminals as shown in figure B. When – lead is used in common with that of the other channel as shown in figure A, it will cause trouble such as blown fuse.



A) Incorrect connection

B) Correct connectio

NOTICE OF CHANGES

The following changes have been made on serial No. F40661 and on, also serial No. G07120 and on.

1. The MODE switch functions have been changed as described below. STEREO-SEPARATE-SQ MATRIX-DERIVE-DISCRETE

EXT DECODER and MONO functions have been disused and instead, SEPARATE and DERIVE functions have been employed.

a. SEPARATE Function
The MODE switch in this position activates front and back amplifiers allowing them to perform different operation. Front channel amplifiers perform normal operation and back amplifiers exclusively as PHONO.

b. DERIVE Function
The MODE switch in this position functions as a converter circuit which converts 2-channel to 4-channel. It functions as a simulated 4-channel by providing reverberation elements collected from right and left input signal by phasing to the back amplifier.

2. QUAD-STEREO circuit in the output circuit has been partially changed and accordingly, the printed board has been switched from "X-25" to "X-33".
The connection mode in speaker – circuit has been changed as follows. Front and back channels were connected by single common lead to the terminals then to the switch board, but with the additional function of l.b, they are connected from the terminals to the switch board by the individual lead.
3. The blinking lamp indicator circuit operated by the aural signal has been disused and the lamp indicator for 2-channel and 4-channel has been employed, instead.
4. The order of the speaker system has been changed from (power) back speaker, front speaker to (power) front speaker, back speaker from the left facing the front.
5. The front panel has been changed in accordance with changes of 1 and 4.
6. The rear chassis has been changed in accordance with changes of 1 and 2.
7. The dial scale has been changed in accordance with a change of 3.

PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the transistors.
2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.
3. Replacement for output and driver transistors, if necessary must be made from the same beta group as the original type.
4. If one output transistor burns out (open or short) always remove all output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohm-meter before inserting a new transistor. All transistors in one channel will be destroyed if the base biasing circuit is open on the emitter end.
5. When mounting a replacement power transistor, be sure the bottom of the flange, the mica insulators and the surface of the heat sink are free of foreign matter, ... for they may cause transistor failure.
6. Silicon grease must be applied between the transistor and the mica insulator, and between the mica insulator and the heat sink for better heat conduction.

BIAS (IDLING CURRENT) ADJUSTMENT

A. DC Balance Adjustment

1. Set Mode switch to DISCRETE, Tape Monitor switch to SOURCE and Selector switch to AUX position.
2. Connect 8-ohm 50W resistor across Left Front Speaker terminals. Then in parallel with load resistor, connect an AC VTVM and the vertical input leads of an oscilloscope.
3. Connect an audio signal generator to Left Front AUX input and apply 1,000Hz (sine wave) signals.
4. Connect AC power cord and rotate Volume Control clockwise — full volume. Increase generator output until sine wave on scope just starts clipping. Adjust DC Balance Control VR601 (on main amp. pcb) for equal clipping on the positive and negative half cycle of the signal — see Figure 1 (a).
5. Repeat the steps 2 thru 4 as above for Left Back (use VR603) and Right channels.

B. Idling Current Adjustment

1. Set Volume Control to minimum position — no signal input.
2. Connect the plus lead of a DC milli-volt meter to Pin No. 9 (on main amp. pcb) and the minus lead to chassis ground — see Figure 1 (b).
3. Rotate Idling Current Control VR602 (on main amp. pcb) to obtain a 7.5mV reading on DC milli-volt meter.
4. Repeat the steps 2 and 3 as above for Back channel (use Pin No. 9' and potentiometer VR604).

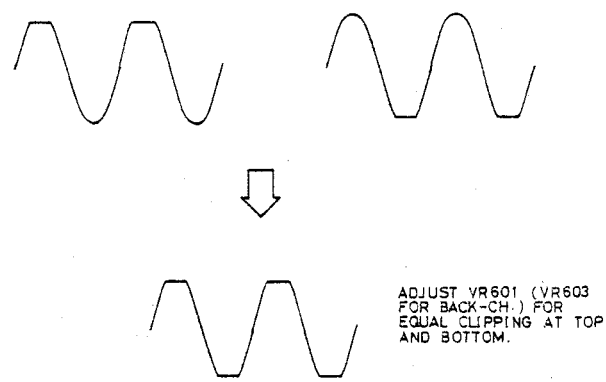


Figure 1 (a). DC Balance Waveforms

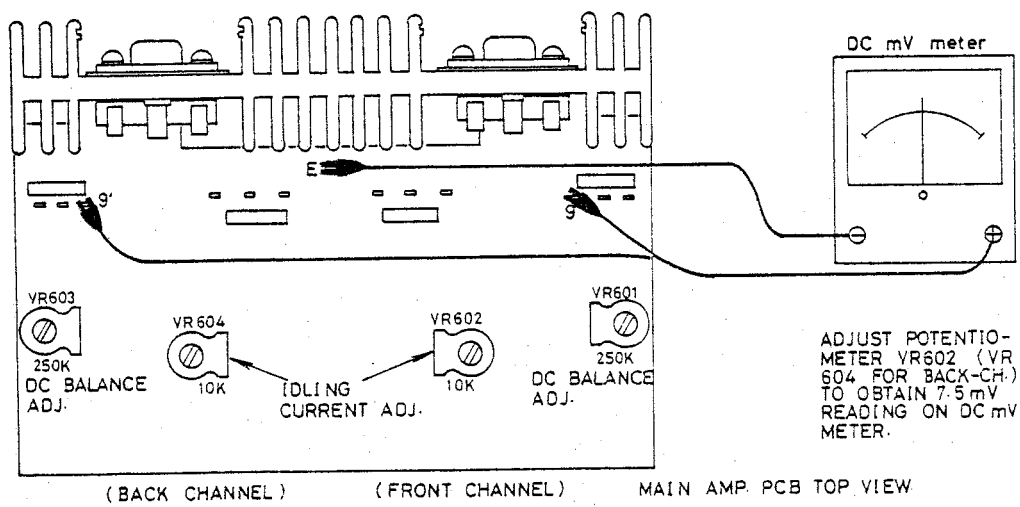


Figure 1 (b). Idling Current Adjustment Hook-up

AM ALIGNMENT PROCEDURE

Instruments: AM Signal Generator and AC VTVM.

NOTES: Set Selector switch to AM.

Input signal must be kept as low as possible to avoid AVC action.

Step	Generator		Tuning Dial Setting	Output Indicator Connected to	Adjust	Adjust for
	Coupling	Frequency				
1	Tr201 Base (on AM IF board) through a 0.01 mfd capacitor.	455 KHz (400 Hz 30% mod.)	Non interferring at low end of scale.	AC VTVM to TAPE OUT (Front) jack. (Left or Right channel)	T203, 202 and 201 (on AM IF board)	Maximum reading on VTVM.
2	Connect to short loop of wire. Radiate signal into ferrite loop-stick antenna.	600 KHz (400 Hz 30% mod.)	600 KHz		L201 (OSC) (on AM IF board) and L002 (ANT coil).	
3		1400 KHz (400 Hz 30% mod.)	1400 KHz		CT5 (OSC trim.) and CT4 (ANT trim.) (on Front end)	
4	Repeat steps 2 and 3 until no further improvement is noticed.					

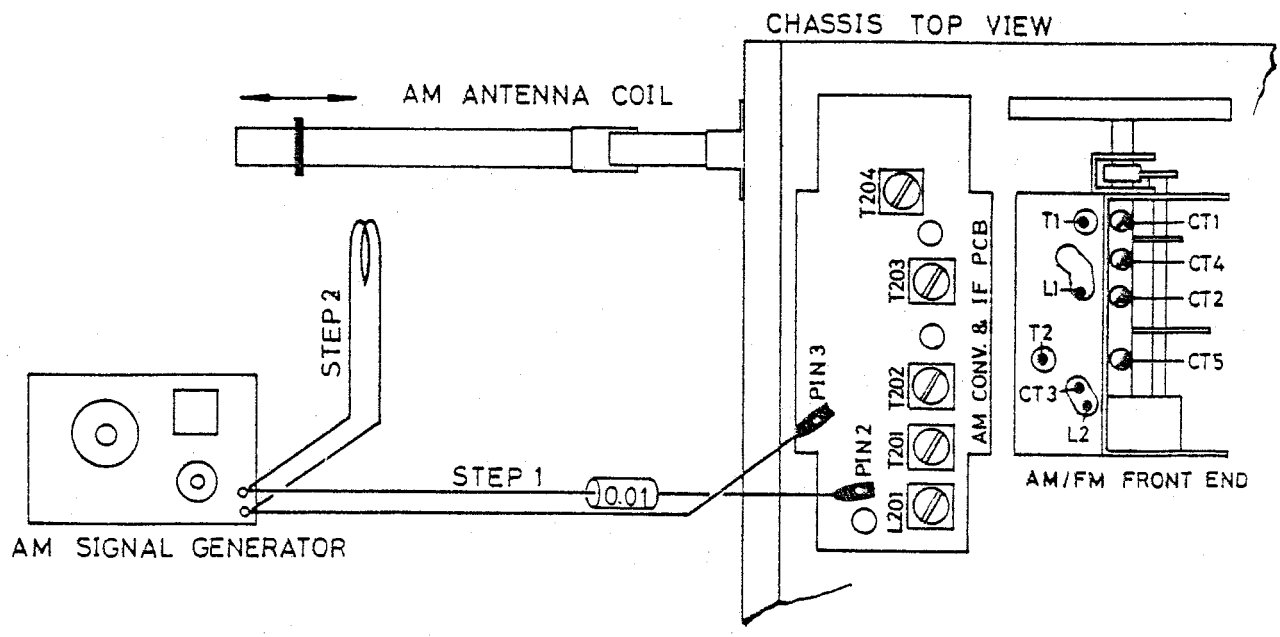


Figure 2. AM Alignment Hook-up

FM IF & RF ALIGNMENT PROCEDURE

Instruments: FM Sweep Generator, FM Signal Generator, AC VTVM and Oscilloscope.

Set Selector switch to FM position.

Set Potentiometers VR101 and 102 to mid-position.

NOTE: Set the Center frequency of the FM Sweep Generator to the frequency of the Bandpass Filter (X101). The Bandpass Filter, X101 in the FM IF circuit, having three different frequencies is used depending upon production variation of filters. The filter with Red mark indicates 10.70MHz; Blue is 10.67MHz and Orange is 10.73MHz.

Step	Generator		Tuning Dial Setting	Output Indicator Connected to	Adjust	Adjust for
	Connected to	Frequency				
1	FM Sweep Generator to FM IF PCB Pin No. 1	10.7 MHz* *See Note above	Quiet point on band	Oscilloscope to FM IF PCB Pin No. 5	T104, 103, 102 & 101 (on FM IF board) Top and Bottom	Maximum and Balanced S curve on scope.
2	Disconnect FM Sweep Generator and connect FM Signal Generator to FM antenna terminals.					
3	FM Signal Generator to FM antenna terminals.	98 MHz (400 Hz 100% mod.)	Tune for maximum output point.	Oscilloscope and AC VTVM to TAPE OUT (Front) jack.	T2, Top & Bottom (on Front end) Touch up T101, 102, 103 and 104 necessary.	Maximum and undistorted amplitude on scope.
4	To align the step 4 and 5, input level must be kept —3db of limiter satulation.	90 MHz (400 Hz 100% mod.)	90 MHz		L2 (OSC), L1 (RF) & T1 (ANT) (on Front end).	Maximum reading on VTVM.
5		106 MHz (400 Hz 100% mod.)	106 MHz		CT3 (OSC), CT2 (RF) & CT1 (ANT) (on Front end).	
6	Repeat steps 4 and 5 until no further improvement is noticed.					

Tuning Meter Sensitivity on FM Adjustment. Set the antenna input level (terminal voltage) to 1-mV by controlling the Signal Generator and adjust the potentiometer VR101 so that the Tuning Meter indicates toward "8" on the scale.

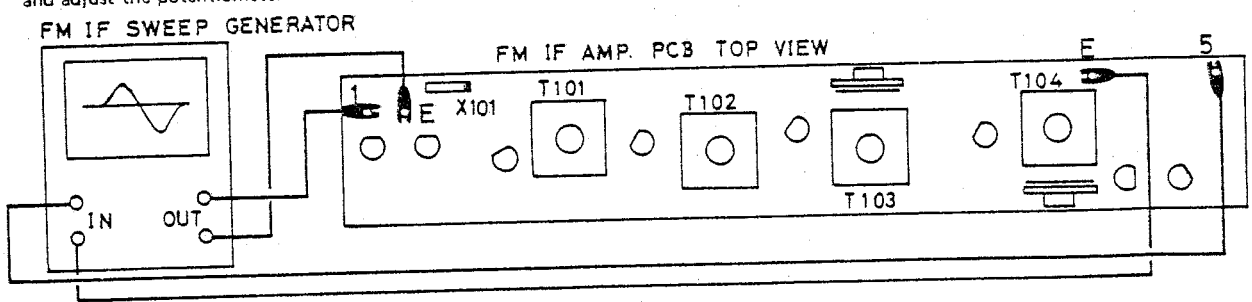


Figure 3 (a). FM IF Alignment Hook-up

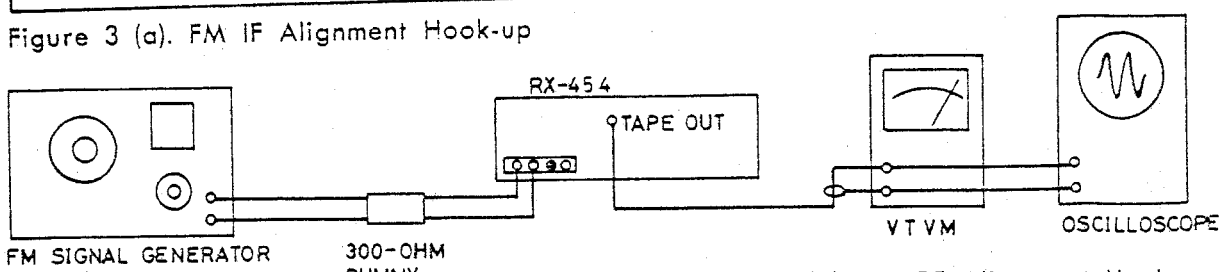


Figure 3 (b). FM RF Alignment Hook-up

FM-STEREO (MPX) ALIGNMENT PROCEDURE

NOTE: The FM IF Amplifier Alignment must be completed before attempting this FM-Stereo Alignment. Poor IF alignment will result in poor Multiplex Adjustment.

Set Selector switch to "FM STEREO."

Connect Stereo Generator to FM antenna terminals.

Set Separation Adj. VR301 (on MPX board) to mid-position before starting this procedure.

Step	Stereo Generator		Output Indicator Connected to	Adjust	Adjust for
	Modulation	RF Deviation			
1	19 KHz Pilot only	1 – 2%	VTVM & Oscilloscope to Test Point (on MPX PCB Pin No. 6)	L301, (Yeilow) and (Black).	Maximum reading on VTVM.
2	Composite 1 KHz signal to Left channel only.	Pilot 10% Signal 70%	VTVM & Oscilloscope to Left channel Tape Out (Front) jack.	L301 (Black)	Maximum and undistorted sine wave on scope.
3	Composite 1 KHz signal to Right channel only.			VR301	Minimum reading on VTVM.
4	Same as in Step 2		VTVM & Oscilloscope to Right channel Tape Out (Front) jack.		
5	Repeat steps 3 and 4 until no further improvement is noticed.				

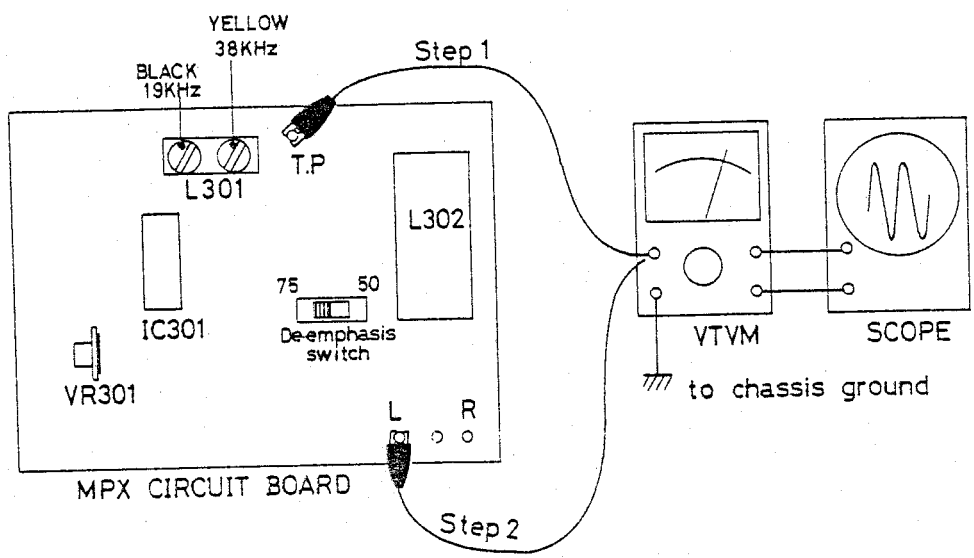


Figure 4. MPX Alignment Hook-up

FM MONO-STEREO AUTOMATIC SWITCHING LEVEL ADJUSTMENT PROCEDURE

1. Connect a VTVM and Oscilloscope to the TAPE OUT jack (Left or Right).
2. Feed the FM signal whose MPX has been varied into the FM ANT terminals.
   MPX VARIATION:

Pilot	10%
Modulation Frequency	1kHz Left or Right
RF Deviation	±45kHz

3. Set the frequency at 98 MHz (when there is disrupting signal, choose another setting).
4. Set the MODE switch to STEREO and FUNCTION switch to FM STEREO.
5. Turn CCW the MONO - STEREO Auto-switching Level Adj. VR101 (on FM IF board): this is a condition in which Auto-switching does not function.
6. Adjust the FM MPX so that the distortion and separation will be best.
7. Adjust the VR101 so that when the antenna input level is 30μV or more, Stereo will switch in and when the input is below the 30μV level, Mono will switch in.
8. After adjustment, check to make sure that, indeed, when the antenna input level exceeds 30μV, Stereo will switch in.

MUTING ALIGNMENT PROCEDURE

NOTE: The circuit on FM IF and FM RF should be set in proper way before the following steps of muting adjustment are taken.

Instruments: FM Signal Generator and Oscilloscope.

Set selector switch to FM and Muting switch to ON position.

Connect the FM Signal Generator to the FM antenna terminals and connect the Oscilloscope to the TAPE OUT (Front) jack (Left or Right channel).

Set the frequency at 98MHz (when there is disrupting signal, choose another setting).

1. The Output wave should be set at the point where it vanishes while turning the potentiometer VR801 (on muting circuit board) and setting the antenna input level at 20μV.
2. After the input level on the antenna comes up to 400μV, the Muting coil L801 should be set in the following manners (see Fig.5).
   A. The wave A or B can be found on scope while turning the core of L801 to the Right or Left.
   B. And the core should be fixed at the point C half way A and B where the wave A equals B.
3. The step 1 should be taken again.
4. It should be confirmed that the muting is out of work at the input level of 30μV on the antenna, and that the waves appear on the oscilloscope.

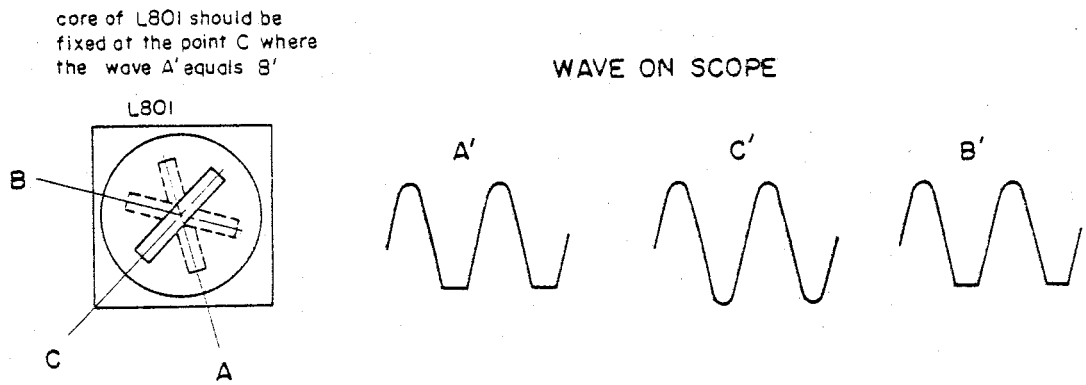


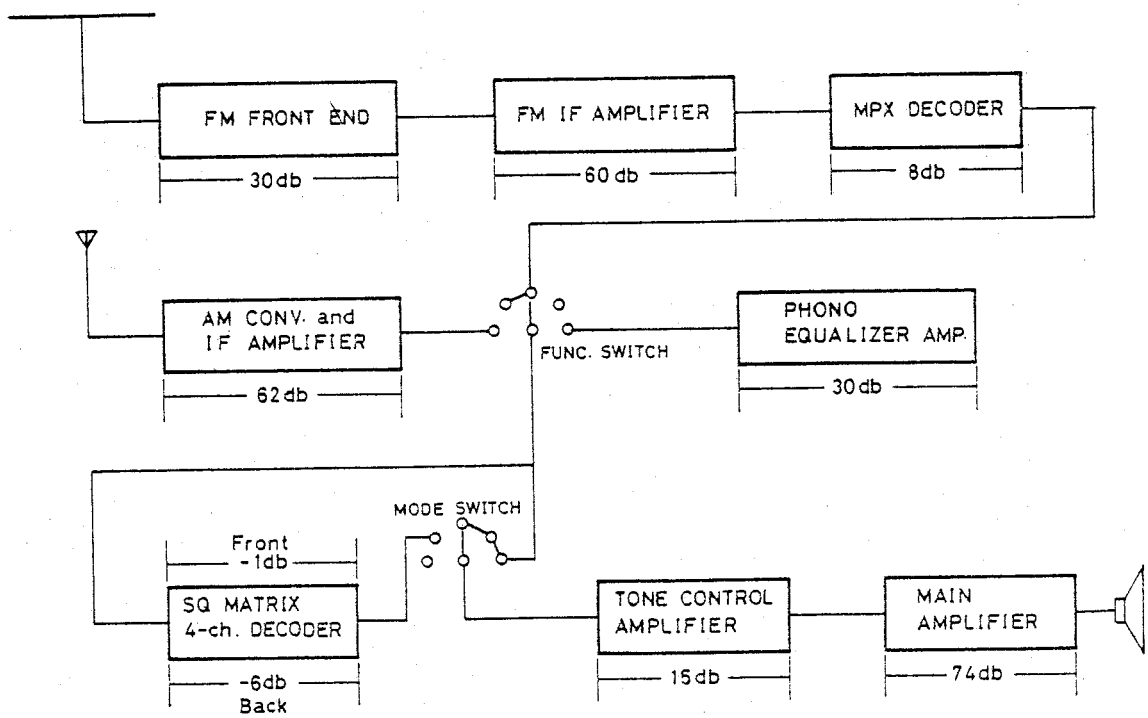
Figure 5.

SQ MATRIX DECODER CHECKING METHOD

Instruments: Audio Generator Oscilloscope and AC VTVM.
Set TONE & BALANCE Controls to mid-position and VOLUME Control to maximum.
Set MODE switch to SQ DECODER and SELECTOR switch to AUX position.
Turn Front & Back speaker switches ON.

1. Connect 8-ohm, 50 watts load resistor to each output terminal of Front-Right, Front-Left, Back-Right and Back-Left channels.
2. Connect Oscilloscope and AC VTVM to Front-Left output terminal in parallel with load resistor.
3. Connect Audio Generator to Front-Left AUX ternimal and apply 1000Hz (sine wave) frequencies.
4. Turn POWER switch ON and adjust Audio Generator until amplifier output comes to 0.775V (0 dB).
5. Measure the oscillation reading on AC VTVM at each terminal when connecting AC VTVM to output terminals of Front-Right, Back-Left and Back-Right channels successively under the same input. Each output being checked can be determined to be normal if the result of each output difference with respect to Front-Left output of 0.775V (o dB) satisfies the following conditions.
   a. Front-Right channel output — -13dB
   b. Back-Right channel output — -5 ~ -6dB
   c. Back-Left channel output — -5 ~ -6dB
6. Connect Audio Generator to Front-Right AUX terminal and adjust Low Frequency Oscillator until Front-Right channel output comes to 0.775V (0 dB).
   (Connect Oscilloscope and AC VTVM to Front-Right output terminal).
7. Measure the output level reading on AC VTVM at each terminal when connecting AC VTVM to output terminals of Front-Left, Back-Left and Back-Right channels successively under the same input. Each output being checked can be determined to be normal if the result of each output difference with respect to Front-Right output of 0.775V (0 cB) satisfies the following conditions.
   a. Front-Left channel output — -13dB
   b. Back-Left channel output — -5 ~ -6dB
   c. Back Right channel output — -5 ~ -6dB
8. Measure amplifier output when applying Audio Generator output to AUX Front terminal of Left and Right channels simultaneously. Output difference between Front and Back channels should be within the range of —5 —6dB and output difference between Back-Left and Back-Right channels should be within 2dB.
9. Check the frequency characteristic of each channel under the same input as that of step 8.
   When switching the frequency on Audio Generator from 1000Hz to 100Hz, then 10KHz, the output level on amplifier for the respective frequency should be within the range of ± 2dB at each channel.

GAIN DIAGRAM



TROUBLE SHOOTING

Unit inoperative (when power activated)

I. If the pilot lamp does not light,
  A. Check the flow at the AC Outlet, and if no voltage across,
    1. contact between the AC plug and the wall outlet may be faulty, or
    2. the AC Cord may be broken, or
    3. connections in the Power Switch may be faulty.
  B. If there is proper voltage across, check the AC Fuse F001 and
    1. If the fuse is blown,
      a capacitor C005, 006, 733, 906 or 907 may be shorted, or
      b rectifier D903, 904, 905 or 906 may be shorted, or
      c primary or secondary winding of the Power Transformer T001 may be shorted.

II. If the pilot lamp does light,
  A. Measure voltage across DC-1, DC-2 and DC-3 (see schematic diagram) and
    1. If no voltage across DC-1,
      a rectifier D903 or 904 may be opened, or
      b secondary winding of the Power Transformer may be opened.
    2. If no voltage across DC-2 and DC-3,
      a rectifier D905 or 906 may be opened, or
      b secondary winding of the Power Transformer may be opened.

Front channel or Back channel inoperative

1. If the Front channel inoperative, check the DC Fuse F002 or 004 and
  A. If the DC Fuse is blown,
    1. a capacitor C611 or 613 may be shorted, or
    2. b transistor Q603, 605, 606, 001 or 002 (Q005 or 006, for R-ch.) may be faulty, or
    3. c speaker circuits (including speaker systems) may be shorted.
  B. If the DC Fuse is OK, check to see if there is signal at the input terminal of Main Amp pcb
    1. If there is signal at the input terminal of Main Amp.,
      a capacitor C601, 603 or 605 may be faulty, or
      b transistor Q601 or 602 may be faulty.
    2. If there is no signal at the input terminal of Main Amp., check to see Tone Control Amp. circuit.
  C. Inoperative when the Mode switch is at "SQ MATRIX" position,
    1. capacitor C708 (C732 for R-ch.) may be faulty, or
    2. transistor Q703 (Q713 for R-ch.) may be faulty.

II. If the Back channel inoperative, check to see the circuits according as item I above.

Only Phono section inoperative

I. capacitor C401, 405 or 408 (C409, 414 or 417 for R-ch.) may be faulty, or

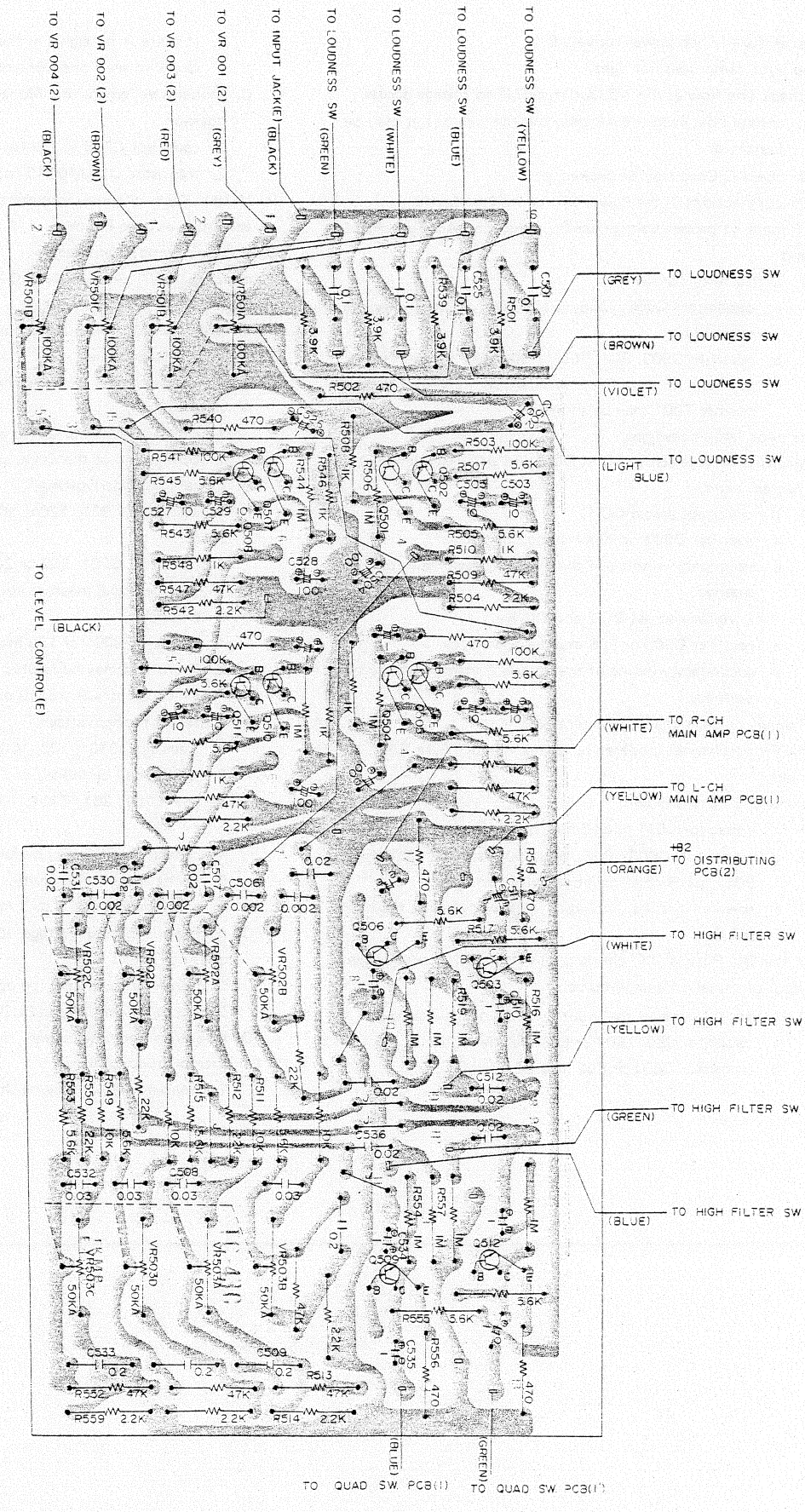
II. transistor Q401 or 402 (Q403 or 404 for R-ch.) may be faulty.

Radio section inoperative

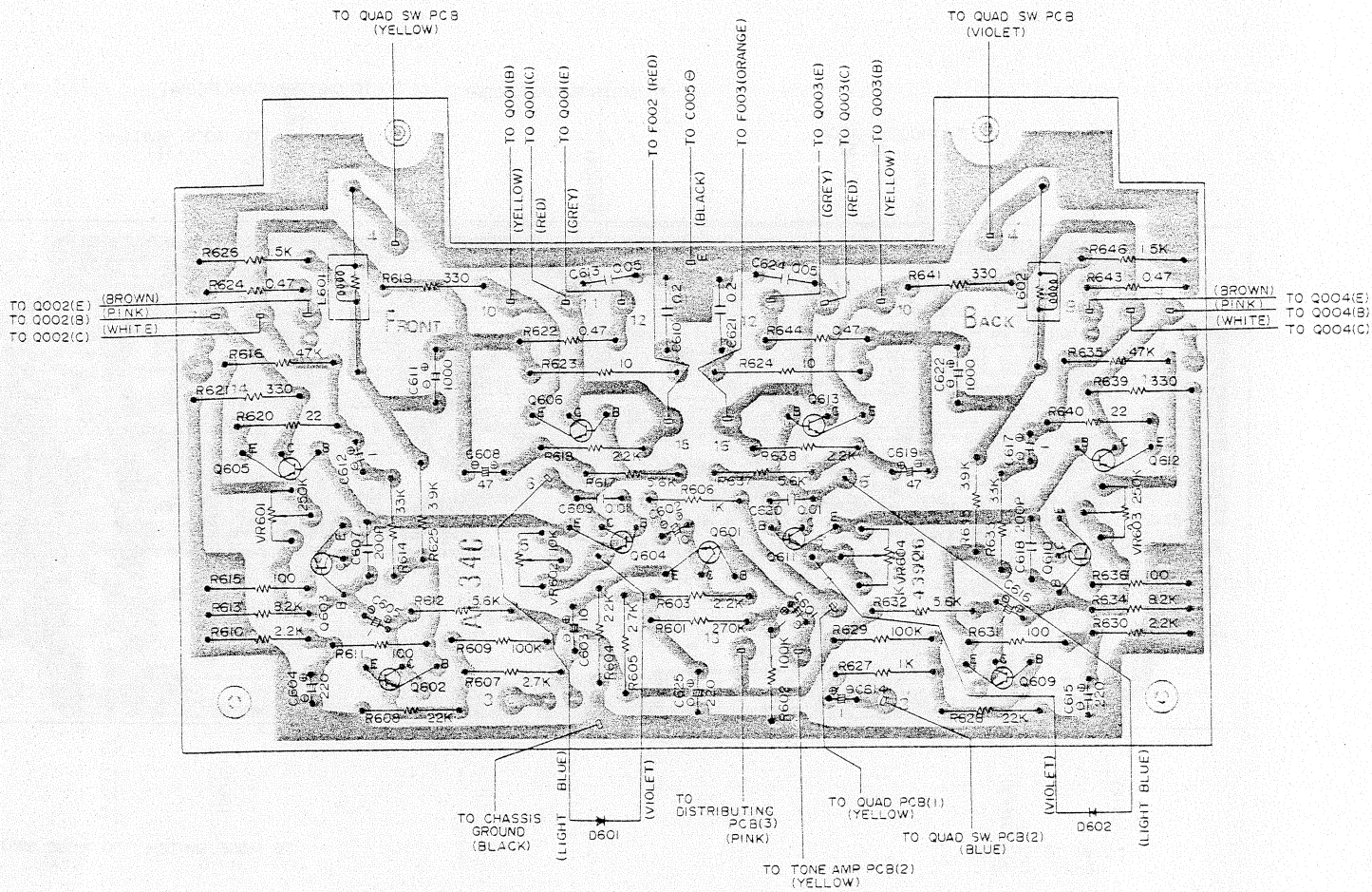
I. If AM is inoperative, measure voltage of AM pcb (B) and
  A. if no voltage,
    1. capacitor C212 or 214 may be shorted, or
    2. connection of the Func. switch may be faulty.
  B. if there is proper voltage,
    1. coil L002, 201, T201, 202, 203 or 204 may be faulty, or
    2. transistor Q201, 202 or 203 may be faulty.

II. If FM is inoperative, measure voltage of FM IF pcb (2) and
  A. if no voltage,
    1. capacitor C001 or 123 may be shorted, or
    2. Front end may be faulty.
      a capacitor C8, 18, 19 or 20 may be faulty.
  B. if there is proper voltage,
    1. transistor Q101, 102, 103, 105 or 107 may be faulty, or
    2. IC301 may be faulty, or
    3. coil L101, 301, T101, 102, 103 or 104 may be faulty, or
    4. capacitor C301 may be faulty, or
    5. Front end may be faulty.
      a transistor Q1, 2 or 3 may be faulty.
  C. if there is proper voltage across B2 but Stereo Indicator does not light
    1. transistor Q301 may be opened, or
    2. stereo indicator lamp PL20 may be faulty.
  D. if Stereo Indicator stays on when signal changes from Stereo to Mono
    1. transistor Q301 may be shorted.

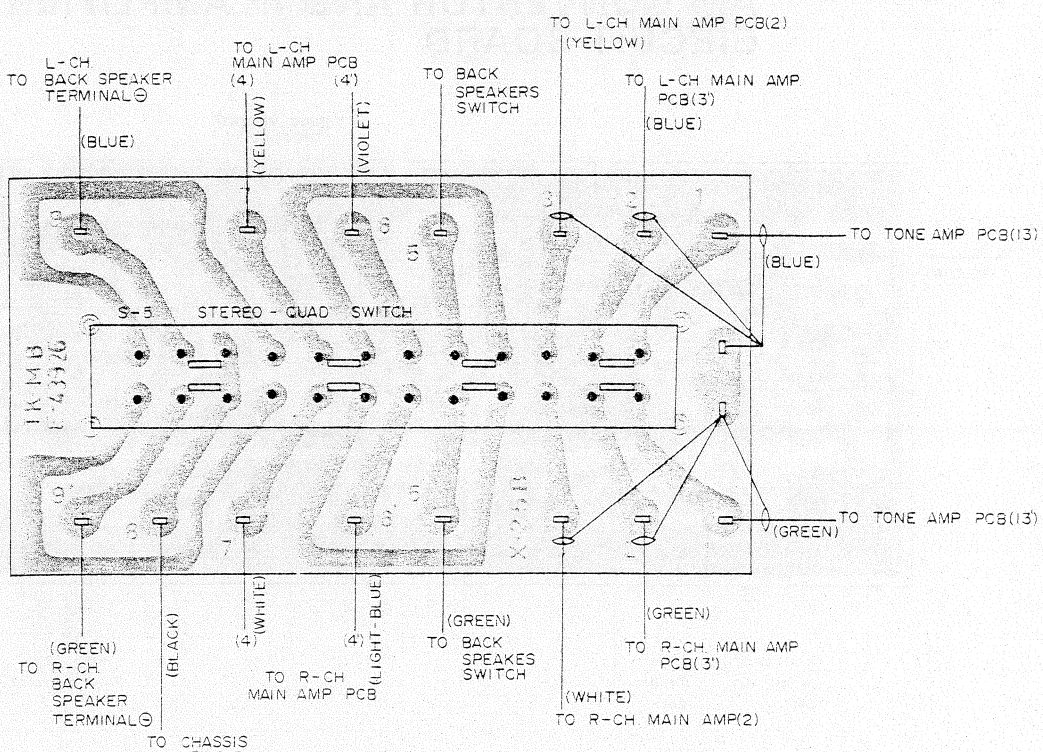
TONE CONTROL AMPLIFIER CIRCUIT BOARD


TO VR 004 (2) (BLACK)
TO VR 002 (2) (BROWN)
TO VR 003 (2) (RED)
TO VR 001 (2) (GREY)
TO INPUT JACK(E) (BLACK)
TO LOUDNESS SW (GREEN)
TO LOUDNESS SW (WHITE)
TO LOUDNESS SW (BLUE)
TO LOUDNESS SW (YELLOW)
(GREY) TO LOUDNESS SW
(BROWN) TO LOUDNESS SW
(VIOLET) TO LOUDNESS SW
(LIGHT BLUE) TO LOUDNESS SW
TO LEVEL CONTROL(E)
(BLACK)
(WHITE) TO R-CH MAIN AMP PCB(1)
(YELLOW) TO L-CH MAIN AMP PCB(1)
+B2
(ORANGE) TO DISTRIBUTING PCB(2)
(WHITE) TO HIGH FILTER SW
(YELLOW) TO HIGH FILTER SW
(GREEN) TO HIGH FILTER SW
(BLUE) TO HIGH FILTER SW
(BLUE)
(GREEN)
TO QUAD SW. PCB(1)
TO QUAD SW. PCB(1)

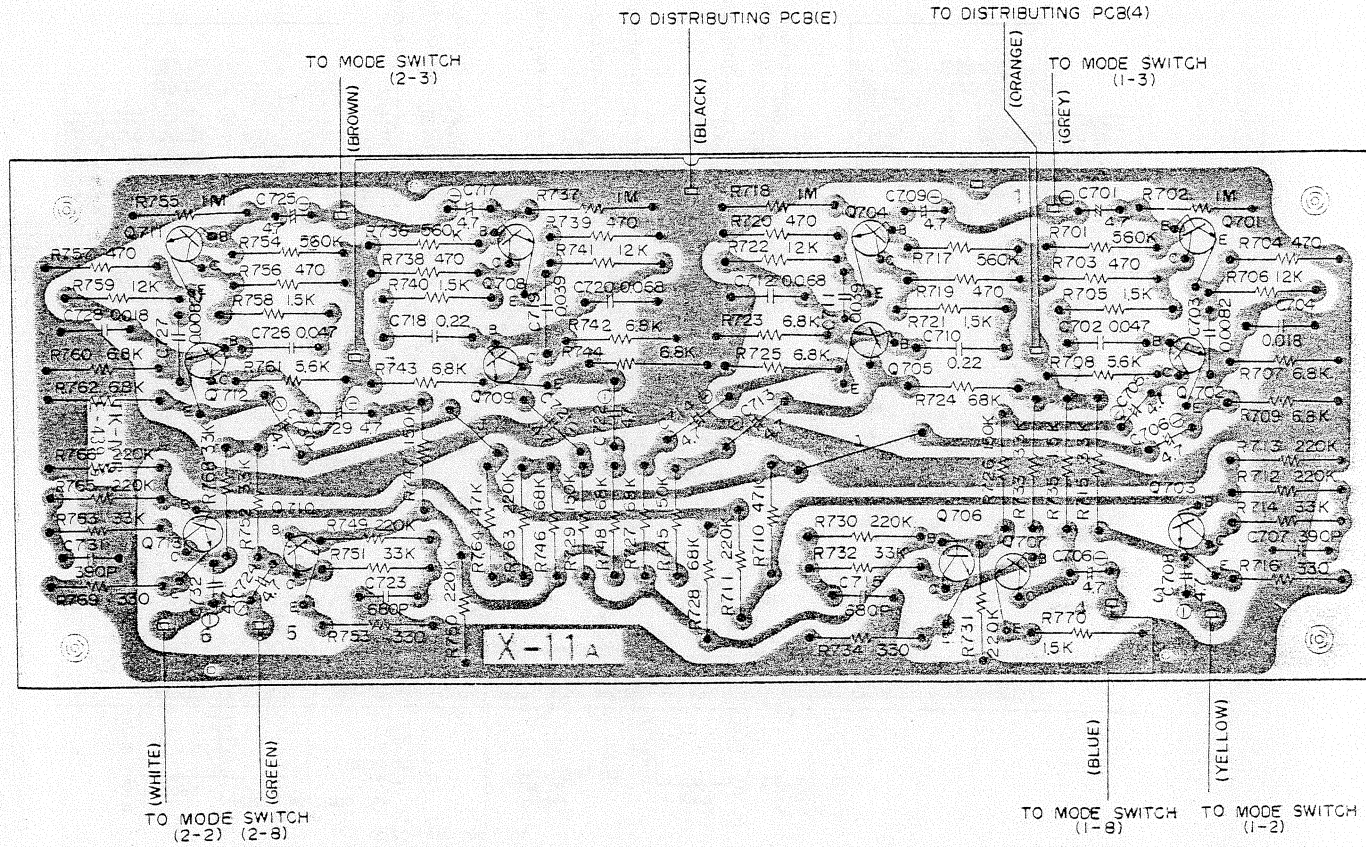
MAIN AMPLIFIER CIRCUIT BOARD



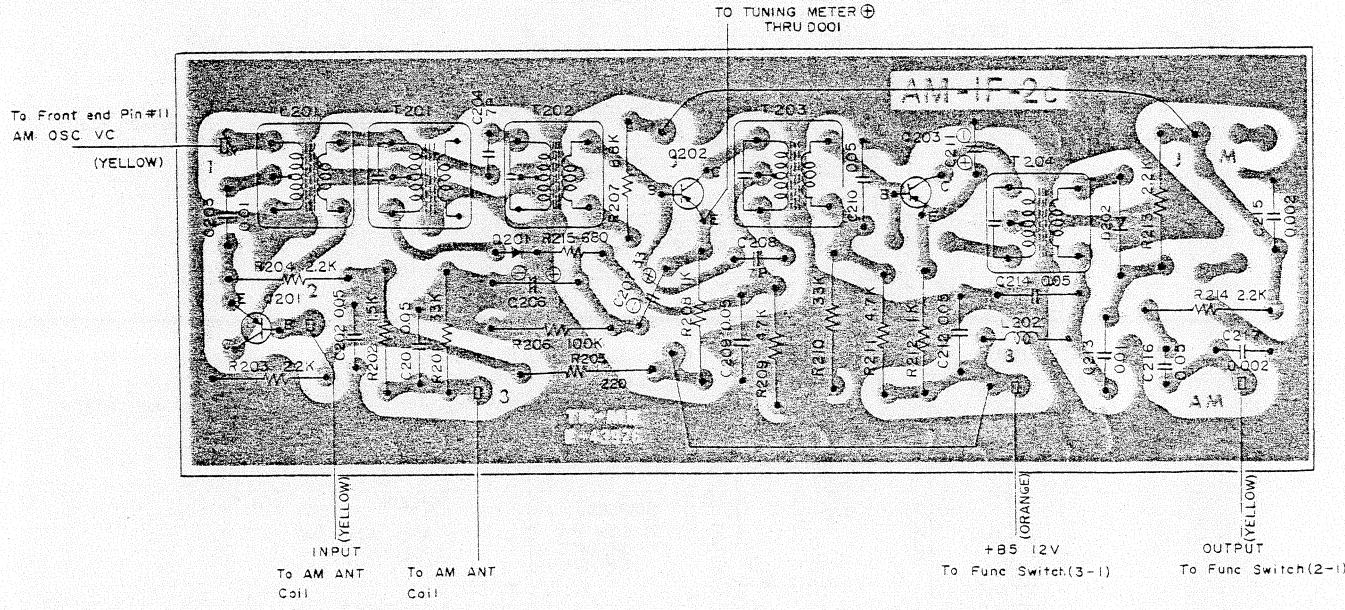
QUAD-STEREO SWITCH CIRCUIT BOARD



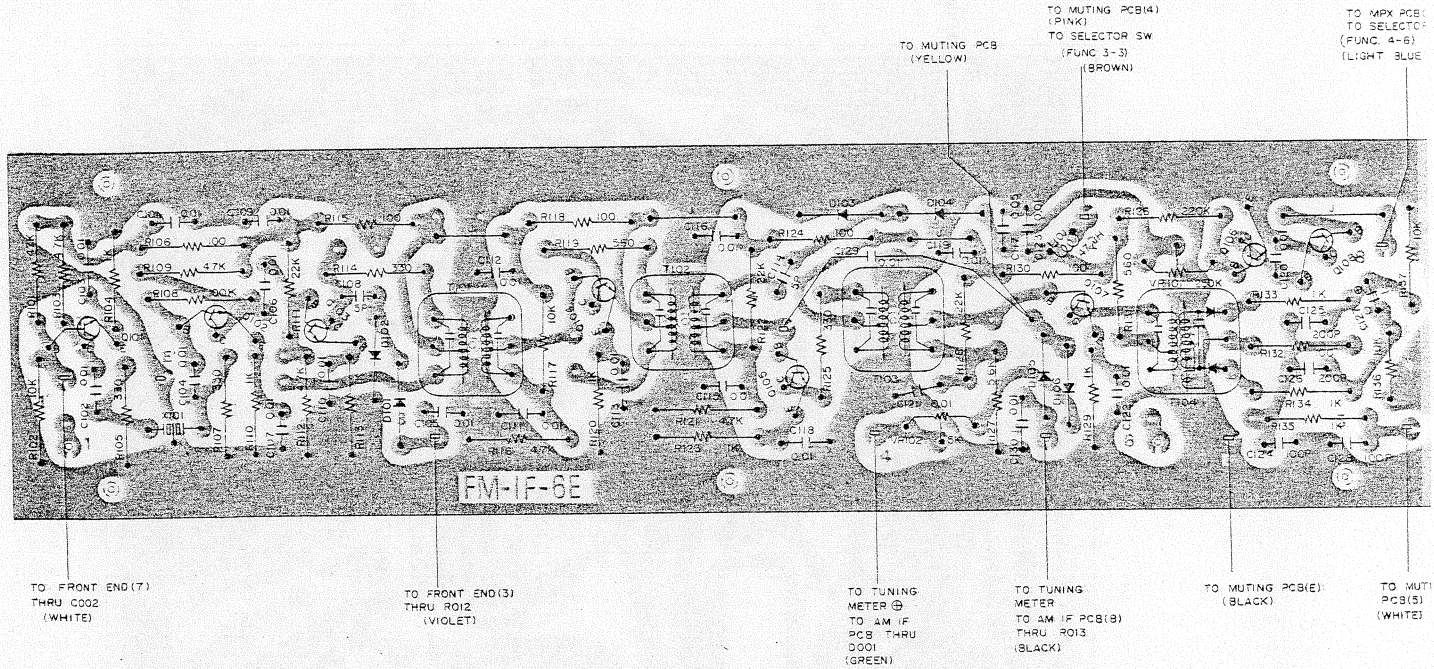
SQ MATRIX 4-CHANNEL DECODER CIRCUIT BOARD



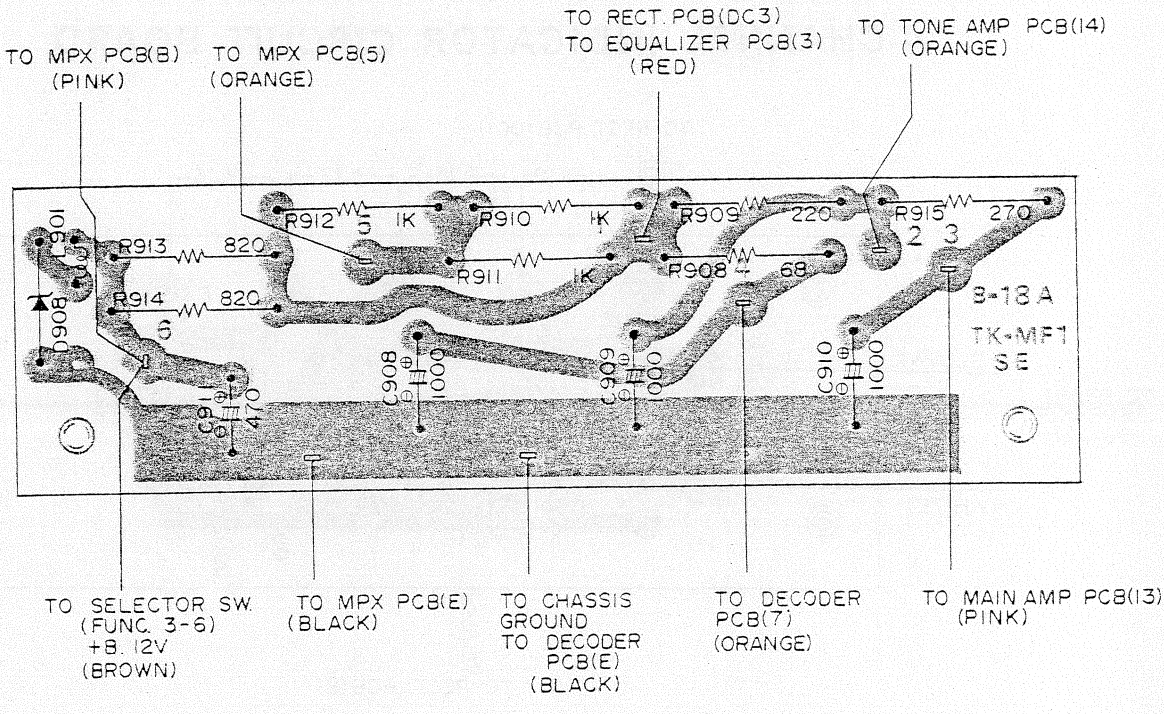
AM CONVERTOR AND IF AMPLIFIER CIRCUIT BOARD



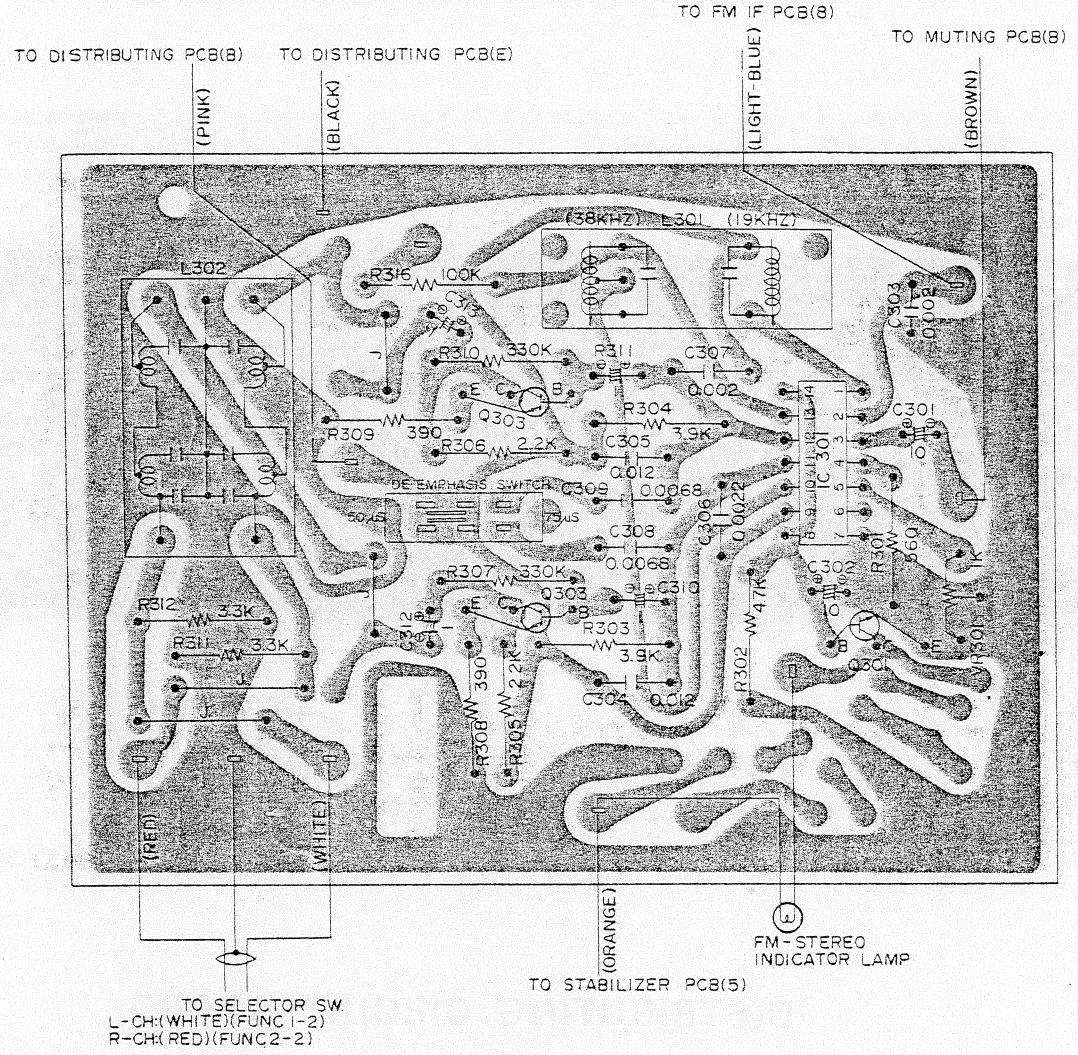
FM IF AMPLIFIER CIRCUIT BOARD


TO MUTING PCB (YELLOW)
TO MUTING PCB(4) (PINK) TO SELECTOR SW (FUNC. 3-3) (BROWN)
TO MPX PCB TO SELECTO (FUNC. 4-6) (LIGHT BLUE
FM-IF-6E
TO FRONT END(7) THRU C002 (WHITE)
TO FRONT END(3) THRU R012 (VIOLET)
TO TUNING METER ⊕ TO AM IF PCB THRU D001 (GREEN)
TO TUNING METER TO AM IF PCB(8) THRU R013 (BLACK)
TO MUTING PCB(E) (BLACK)
TO MUTI PCB(5) (WHITE)

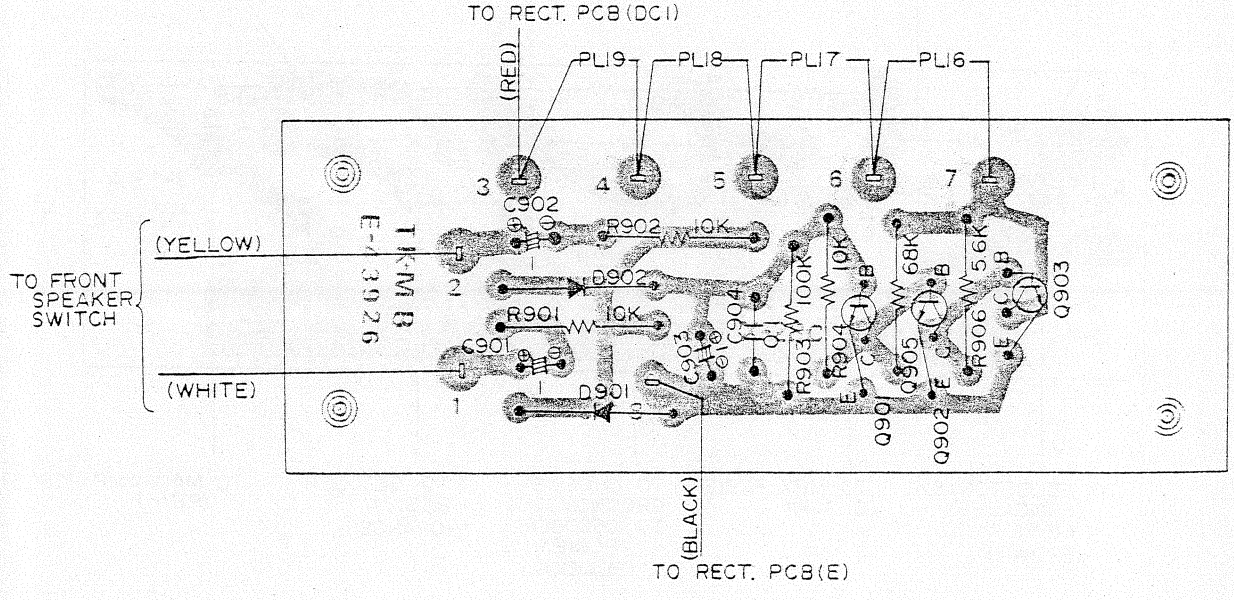
DISTRIBUTING CIRCUIT BOARD



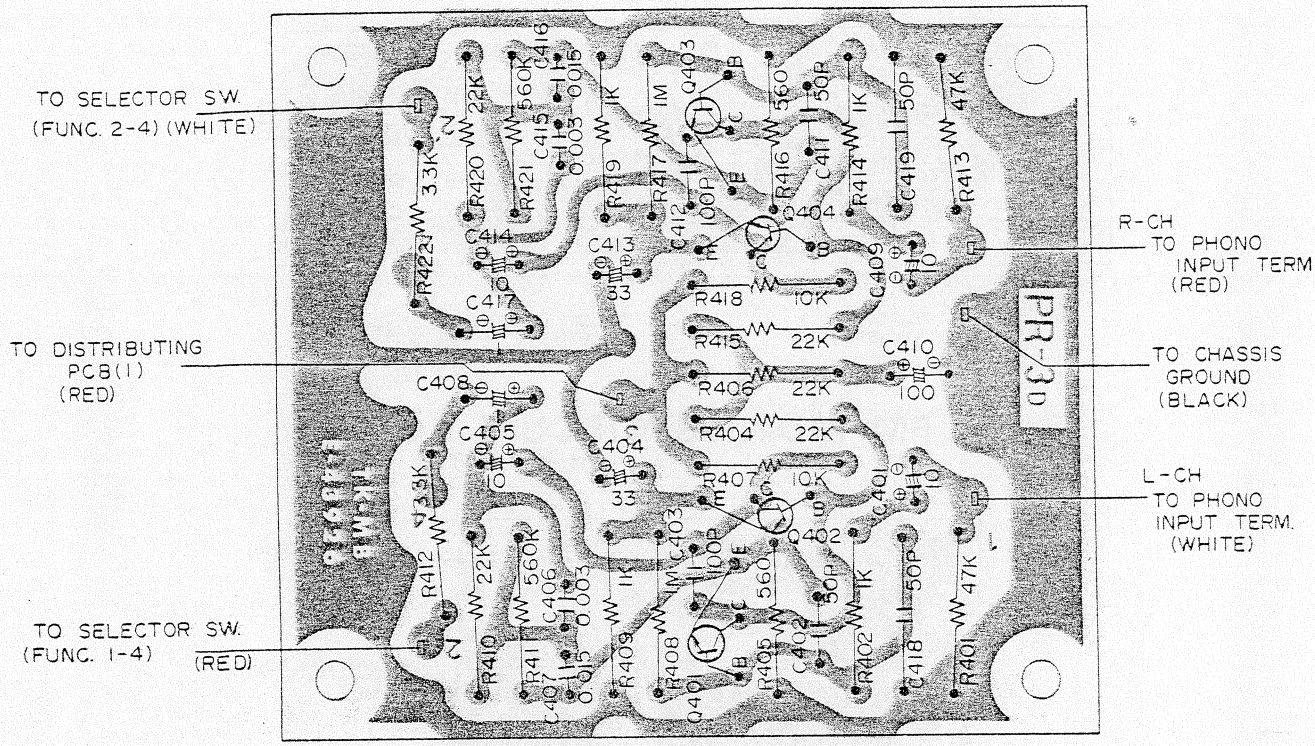
FM MPX DECODER CIRCUIT BOARD



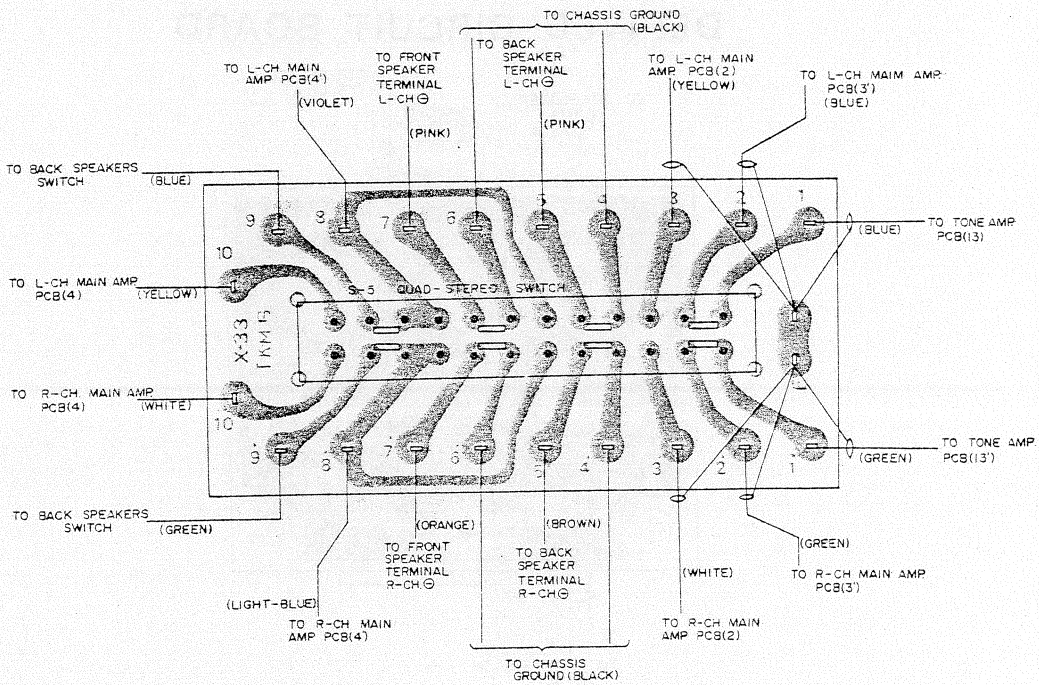
4-CHANNEL INDICATOR CIRCUIT BOARD



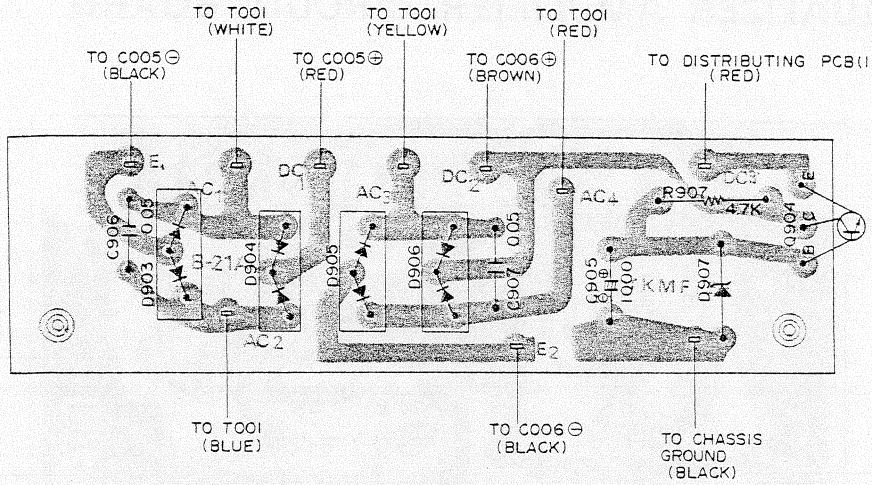
EQUALIZER AMPLIFIER CIRCUIT BOARD


TO SELECTOR SW. (FUNC. 2-4) (WHITE)
TO DISTRIBUTING PCB(1) (RED)
TO SELECTOR SW. (FUNC. 1-4) (RED)
R-CH TO PHONO INPUT TERM. (RED)
TO CHASSIS GROUND (BLACK)
L-CH TO PHONO INPUT TERM. (WHITE)
PR-3D

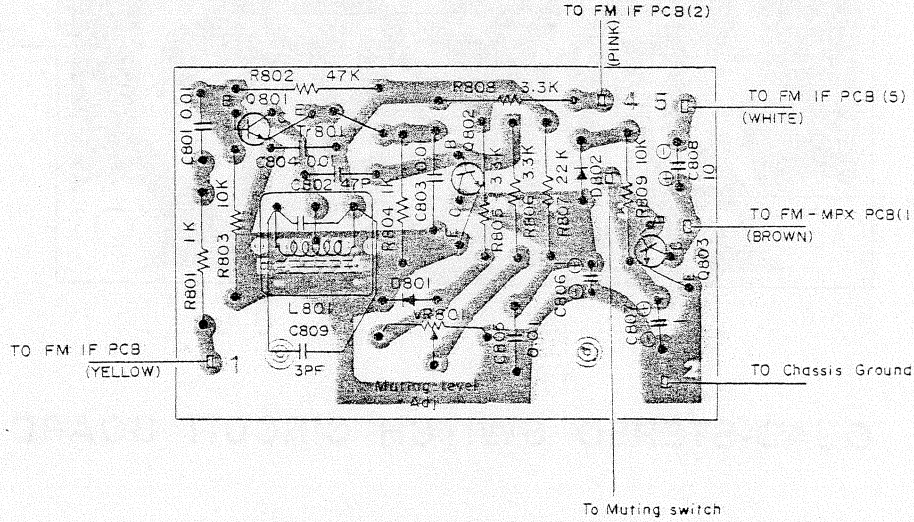
QUAD-STEREO SWITCH CIRCUIT BOARD



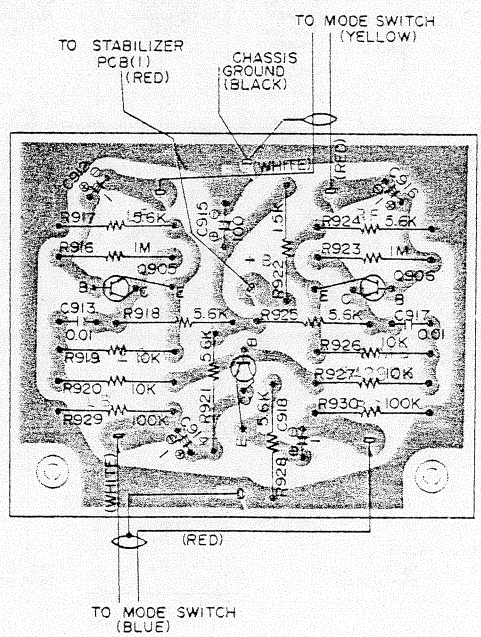
RECTIFIER CIRCUIT BOARD



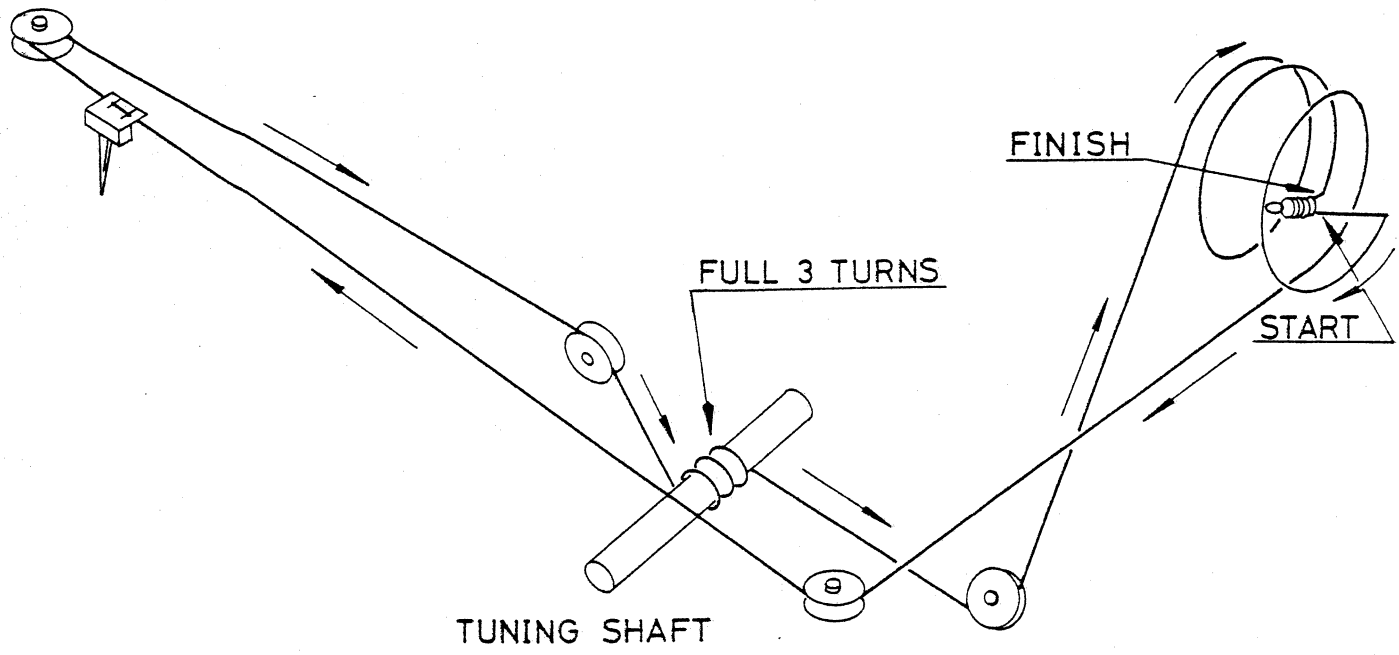
FM MUTING CIRCUIT BOARD

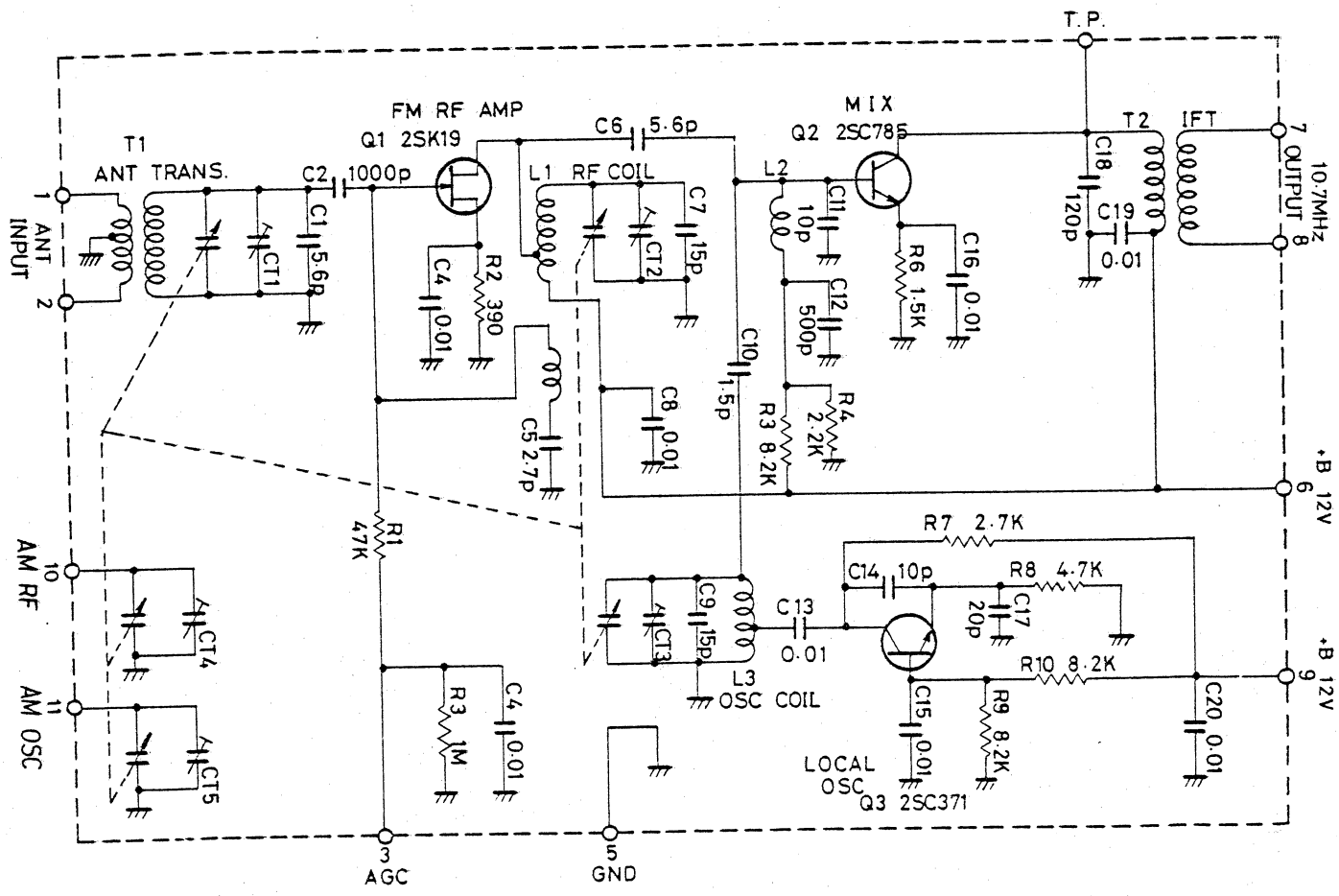


DERIVED CIRCUIT BOARD

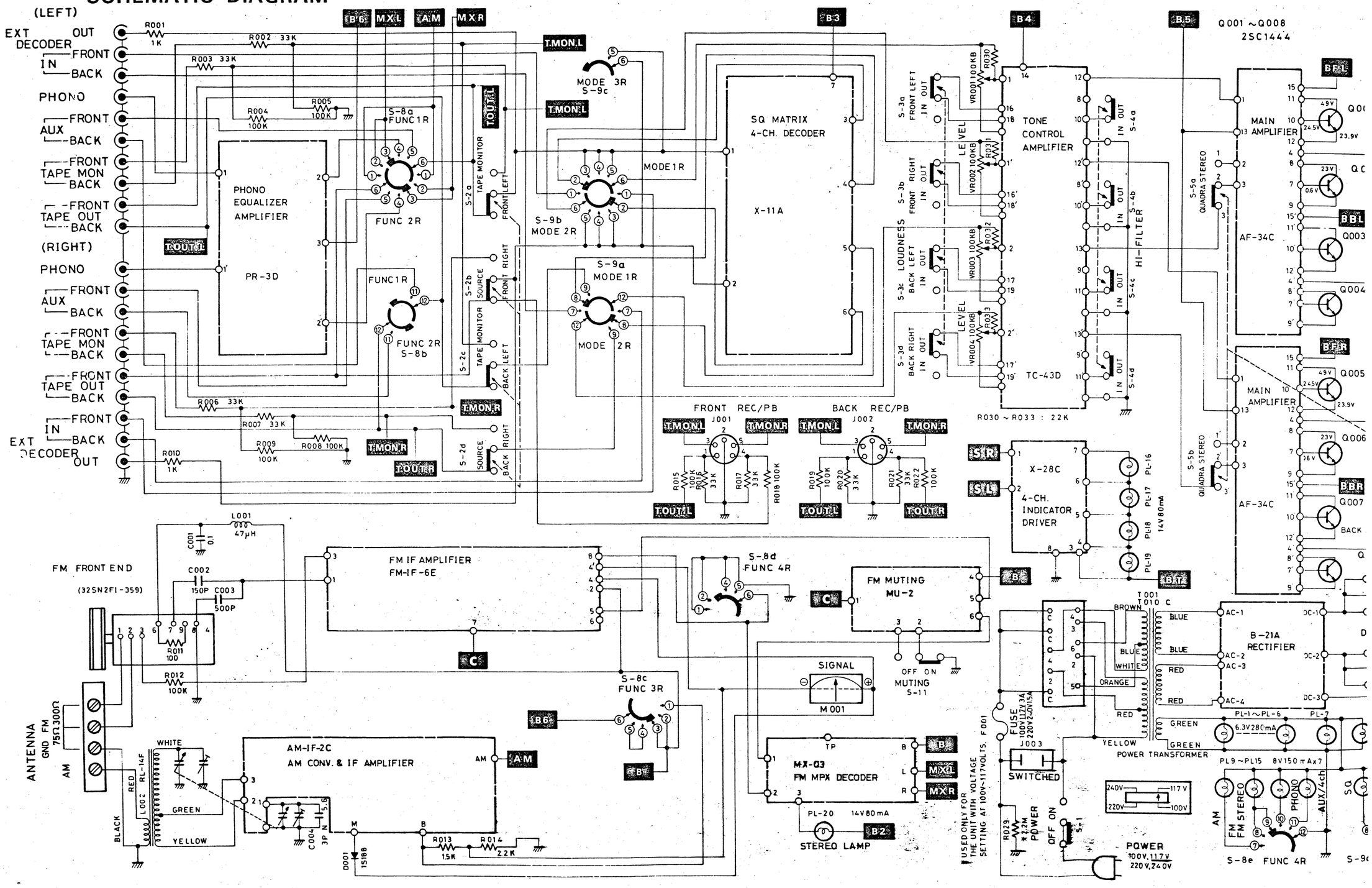


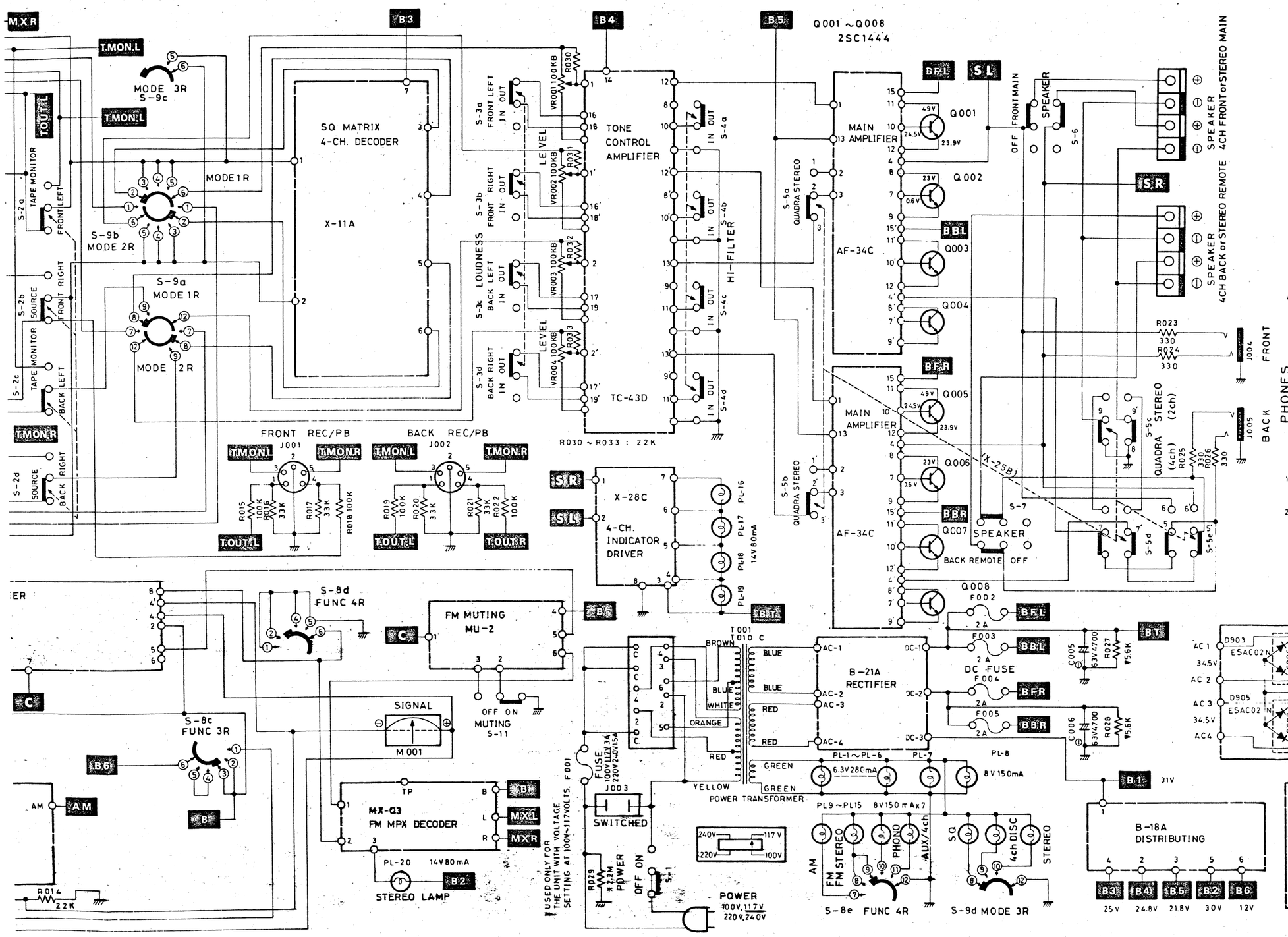
DIAL STRINGING & FRONT END SCHEMATIC DIAGRAMS





SCHEMATIC DIAGRAM


(LEFT)
EXT DECODER OUT
FRONT IN BACK
PHONO
FRONT AUX BACK
FRONT TAPE MON BACK
FRONT TAPE OUT BACK
(RIGHT)
PHONO
FRONT AUX BACK
FRONT TAPE MON BACK
FRONT TAPE OUT BACK
FRONT IN BACK
EXT DECODER OUT
R001 1K
R002 33K
R003 33K
R004 100K
R005 100K
R006 33K
R007 33K
R008 100K
R009 100K
R010 1K
PHONO EQUALIZER AMPLIFIER
PR-3D
T.OUT.L
T.OUT.R
T.MON.L
T.MON.R
MXL
MXR
AM
B6
B3
B4
B5
S-8a FUNC 1R
FUNC 2R
FUNC 1R
FUNC 2R S-8b
S-2a TAPE MONITOR FRONT LEFT
S-2b SOURCE FRONT RIGHT
S-2c TAPE MONITOR BACK LEFT
S-2d SOURCE BACK RIGHT
MODE 3R S-9c
MODE 1R
S-9b MODE 2R
S-9a MODE 1R
MODE 2R
SQ MATRIX 4-CH. DECODER
X-11A
FRONT REC/PB
BACK REC/PB
J001
J002
R015 100K
R016 33K
R017 33K
R018 100K
R019 100K
R020 33K
R021 33K
R022 100K
S-3a FRONT LEFT IN OUT
S-3b FRONT RIGHT IN OUT
S-3c BACK LEFT IN OUT
S-3d BACK RIGHT IN OUT
LEVEL
LOUDNESS
VR001 100KB R030
VR002 100KB R031
VR003 100KB R032
VR004 100KB R033
TONE CONTROL AMPLIFIER
TC-43D
S-4a IN OUT
S-4b IN OUT
S-4c IN OUT
S-4d IN OUT
HI-FILTER
R030 ~ R033 : 22K
Q001 ~Q008
2SC1444
MAIN AMPLIFIER
AF-34C
S-5a QUADRA STEREO
S-5b QUADRA STEREO
BFL
BBL
BFR
BBR
Q001
Q003
Q004
Q005
Q006
Q007
49V
24.5V
23.9V
23V
0.6V
36V
BACK
L001 47μH
C001 0.1
C002 150P
C003 500P
R011 100
R012 100K
FM FRONT END
(32SN2FI-359)
FM IF AMPLIFIER
FM-IF-6E
S-8d FUNC 4R
FM MUTING
MU-2
OFF ON
MUTING S-11
SIGNAL
M 001
S-8c FUNC 3R
ANTENNA
GND FM 75Ω 300Ω
AM
WHITE
RED
GREEN
YELLOW
BLACK
L002 RL-14F
AM-IF-2C
AM CONV. & IF AMPLIFIER
C004 5.6 3P N
D001 1S188
R013 1.5K
R014 2.2K
MX-03
FM MPX DECODER
PL-20 14V 80mA
STEREO LAMP
B2
B7
B8
B9
B10
B11
B12
B13
B14
B15
B16
B17
B18
B19
B20
B21
B22
B23
B24
B25
B26
B27
B28
B29
B30
B31
B32
B33
B34
B35
B36
B37
B38
B39
B40
B41
B42
B43
B44
B45
B46

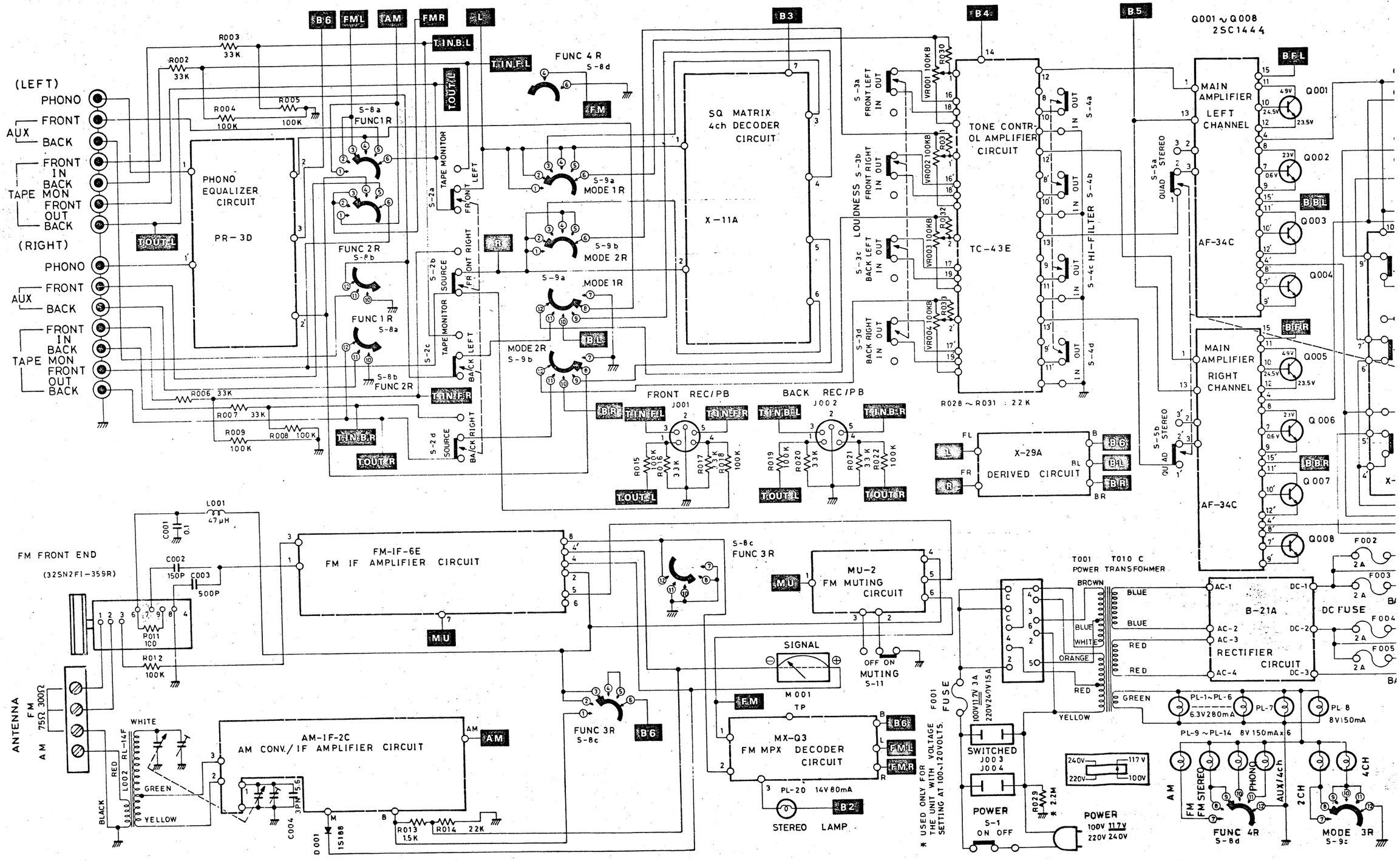


(RESISTORS)

5% TORERANCE UNLESS OTHERWISE NOTED.
K---KILO OHM.
M---MEGA OHM.
▼---COMPOSITION RESISTORS 1/2 WATT.
NON MARK---LOW NOISE TYPE CARBON RESISTORS.

(CAPACITORS)

MY--MYLAR FILM CAPACITORS.
T--TANTALUM CAPACITORS.
ELECTROLYTIC CAPACITORS.
LN--LOW NOISE TYPE ELECTROLYTIC CAPACITORS.
NON MARK---CERAMIC CAPACITORS.
UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITOR VALUES ARE EXPRESSED IN MFD.
S--POLY STYROL CAPACITORS.
VOLTAGE READING WITH VTVM FROM THE POINT SHOWN TO THE CHASSIS GROUND (LINE VOLTAGE 117 VOLT)
VOLTAGE READING MAY VARY ±20%.


(LEFT)
PHONO
AUX FRONT
BACK
TAPE MON FRONT IN
BACK
FRONT OUT
BACK
(RIGHT)
PHONO
AUX FRONT
BACK
TAPE MON FRONT IN
BACK
FRONT OUT
BACK
PHONO EQUALIZER CIRCUIT
PR-3D
R002 33K
R003 33K
R004 100K
R005 100K
R006 33K
R007 33K
R008 100K
R009 100K
S-8a FUNC 1R
S-8b FUNC 2R
S-8c FUNC 3R
S-8d FUNC 4R
S-9a MODE 1R
S-9b MODE 2R
S-2a TAPE MONITOR FRONT LEFT
S-2b SOURCE FRONT RIGHT
S-2c TAPE MONITOR BACK LEFT
S-2d SOURCE BACK RIGHT
SQ MATRIX 4ch DECODER CIRCUIT
X-11A
S-3a FRONT LEFT IN OUT
S-3b FRONT RIGHT IN OUT
S-3c BACK LEFT IN OUT
S-3d BACK RIGHT IN OUT
LOUDNESS
VR001 100KB R030
VR002 100KB R031
VR003 100KB R032
VR004 100KB R033
R028 ~ R031 : 22K
TONE CONTROL AMPLIFIER CIRCUIT
TC-43E
S-4a IN OUT
S-4b IN OUT
S-4c HI-FILTER IN OUT
S-4d IN OUT
FRONT REC/PB
BACK REC/PB
J001
J002
R015 100K
R016 33K
R017 33K
R018 100K
R019 100K
R020 33K
R021 33K
R022 100K
X-29A DERIVED CIRCUIT
S-5a QUAD STEREO
S-5b QUAD STEREO
MAIN AMPLIFIER LEFT CHANNEL
MAIN AMPLIFIER RIGHT CHANNEL
AF-34C
Q001 ~ Q008
2SC1444
Q001
Q002
Q003
Q004
Q005
Q006
Q007
Q008
FM FRONT END
(32SN2FI-359R)
L001 47μH
C001 0.1
C002 150P
C003 500P
R011 1C0
R012 100K
FM-IF-6E FM IF AMPLIFIER CIRCUIT
MU-2 FM MUTING CIRCUIT
SIGNAL
M001
OFF ON MUTING S-11
ANTENNA
FM 75Ω 300Ω
AM
WHITE
RED
BLACK
GREEN
YELLOW
L002 RL-14F
AM-IF-2C AM CONV./IF AMPLIFIER CIRCUIT
C004 3P 5.6
D001 1S188
R013 1.5K
R014 22K
MX-Q3 FM MPX DECODER CIRCUIT
PL-20 14V 80mA
STEREO LAMP
T001 T010 C POWER TRANSFOHMER
BROWN
BLUE
BLUE
BLUE WHITE
ORANGE
RED
RED
RED
GREEN
YELLOW
B-21A RECTIFIER CIRCUIT
AC-1
AC-2
AC-3
AC-4
DC-1
DC-2
DC-3
DC FUSE
F002 2A
F003 2A
F004 2A
F005 2A
F001 FUSE 100V 117V 3A 220V 240V 1.5A
SWITCHED J003 J004
POWER S-1 ON OFF
R029 * 22M
240V 117V 220V 100V
POWER 100V 117V 220V 240V
* USED ONLY FOR THE UNIT WITH VOLTAGE SETTING AT 100-120VOLTS.
PL-1~PL-6 6.3V 280mA
PL-7
PL 8 8V 150mA
PL-9 ~PL-14 8V 150mA x 6
AM
FM FM STEREO
PHONO
AUX/4ch
2CH
4CH
FUNC 4R S-8d
MODE 3R S-9c
B6
B5
B4
B3
B2
B1
FML
FMR
FM
AM
TUNER
TOUT
T.IN.B.L
T.IN.F.L
T.IN.F.R
T.IN.B.R

This schematic diagram is applicable to units with following serial numbers and onward

Ⓕ 40661 ⟶

Ⓖ 07120 ⟶

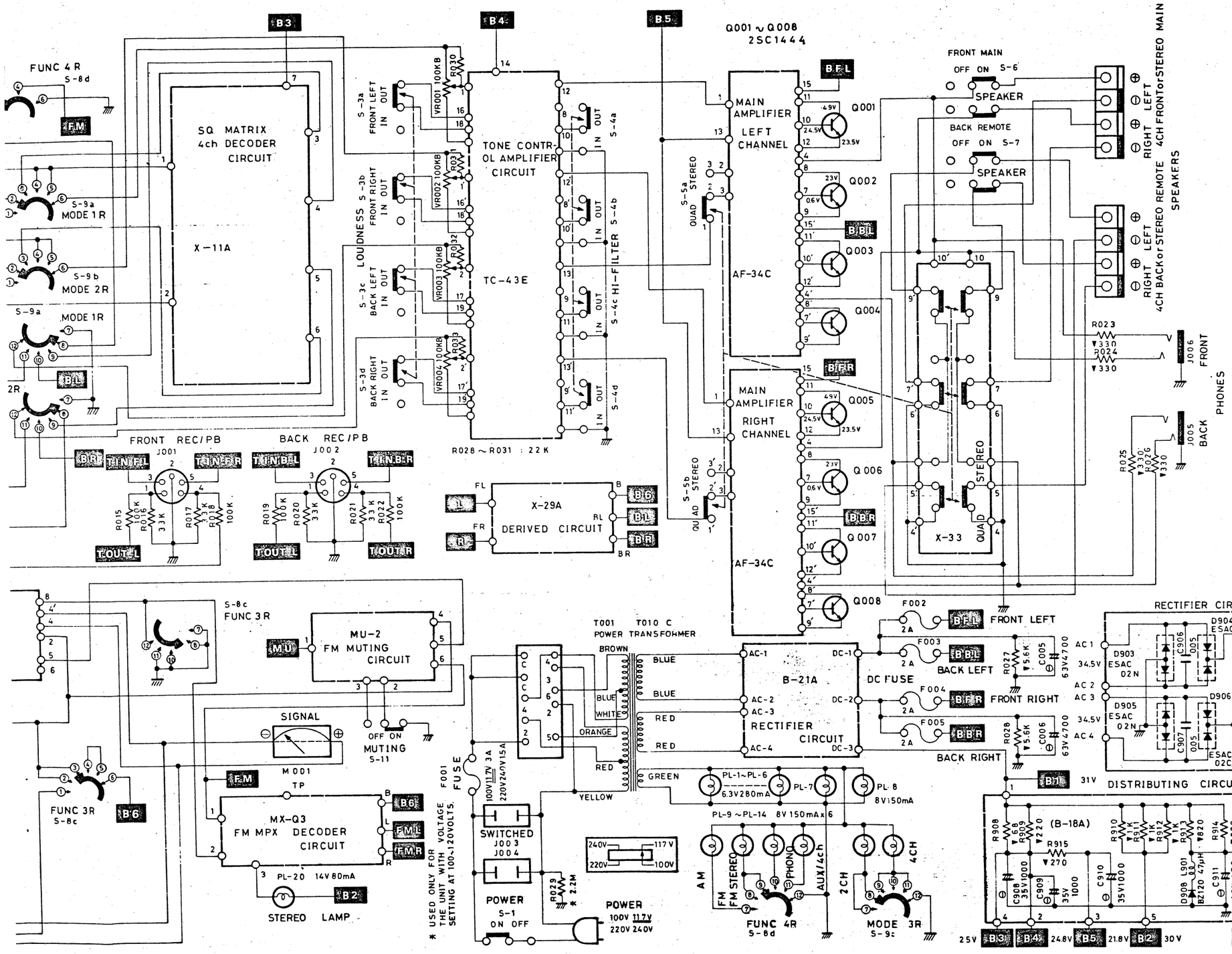
(RESISTORS)

5% TORERANCE UNLESS OTHERWISE NOTED.
(K)--KILO OHM.
(M)--MEGA OHM.
▼-- COMPOSITION RESISTORS 1/2 WATT.
NON MARK---LOW NOISE TYPE CARBON RESISTORS.

(CAPACITORS)

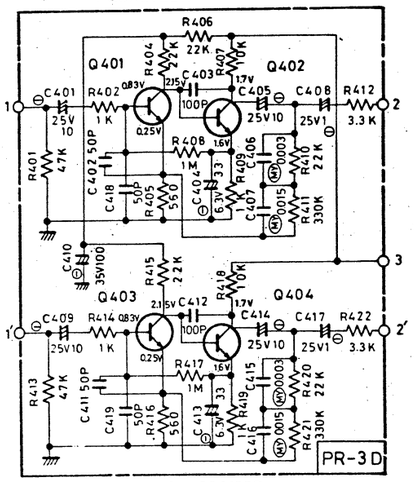
(MY)--MYLAR FILM CAPACITORS.
(T)--TANTALUM CAPACITORS.
✱-ELECTROLYTIC CAPACITORS.
LN--LOW NOISE TYPE ELECTROLYT CAPACITORS.
NON MARK---CERAMIC CAPACITOR.
UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITOR VALUES ARE EXPESSED IN MFD.
(S)- POLY STYROL CAPACITORS.

VOLTAGE READING WITH VTVM FROM THE POINT SHOWN TO THE CHASS GROUND (LINE VOLTAGE 117VOLT)
VOLTAGE READING MAY VARY ± 20%.



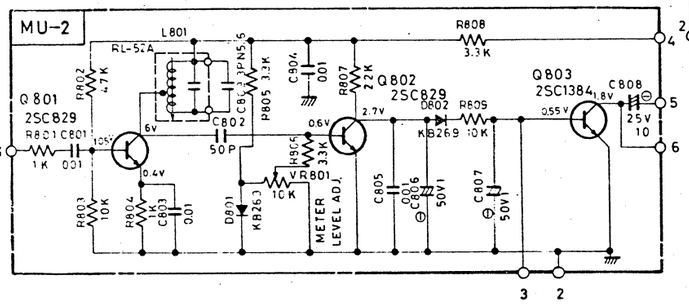
RX 454

EQUALIZER AMP CIRCUIT

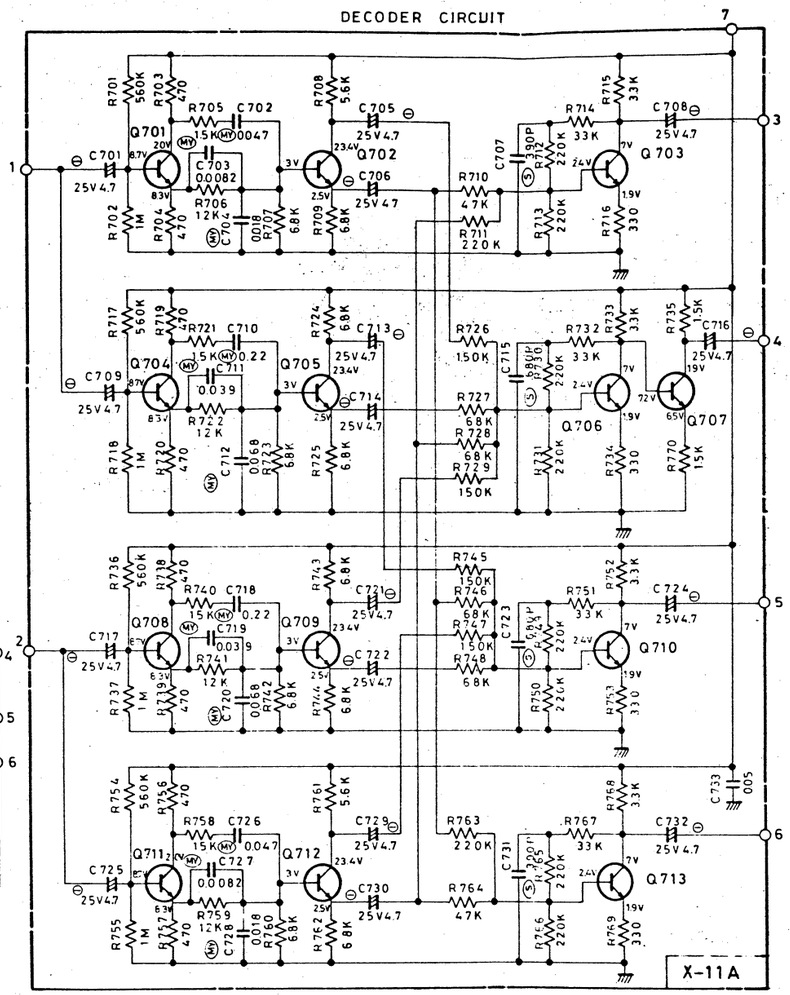


Q401 ~ Q404 : 2SC1327

FM MUTING CIRCUIT

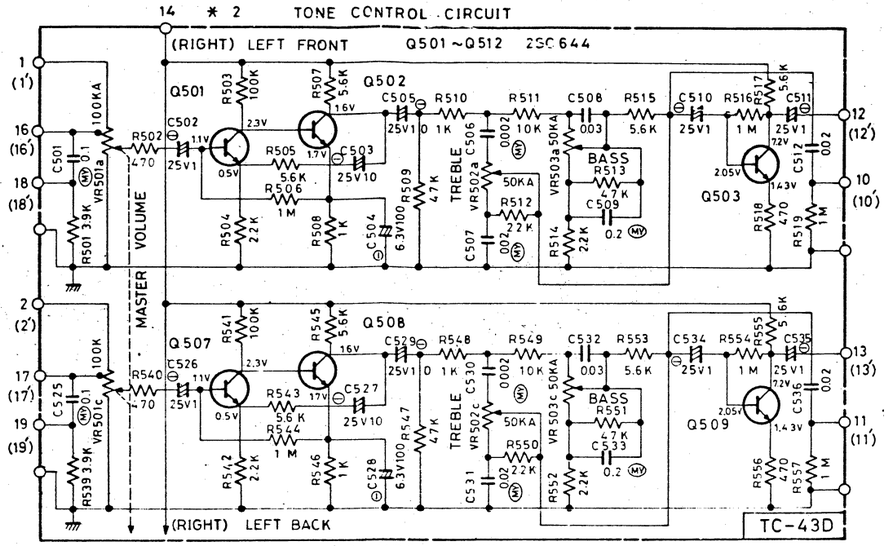


DECODER CIRCUIT

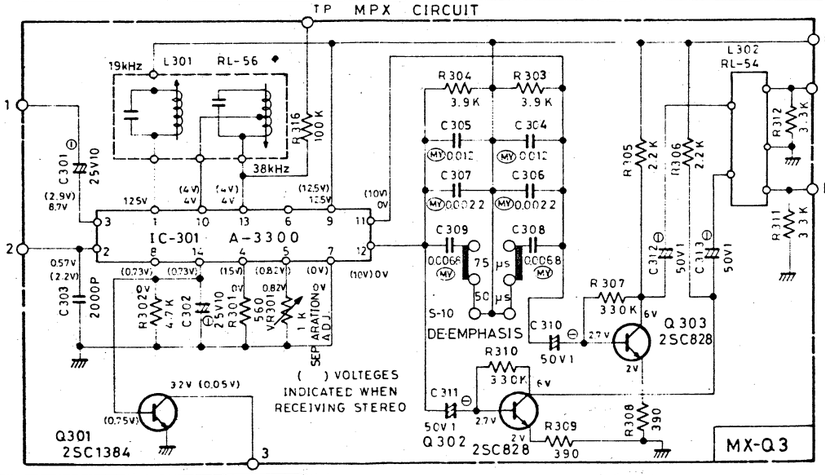


Q701 ~ Q713 : 2SC1327 or 2SC1328

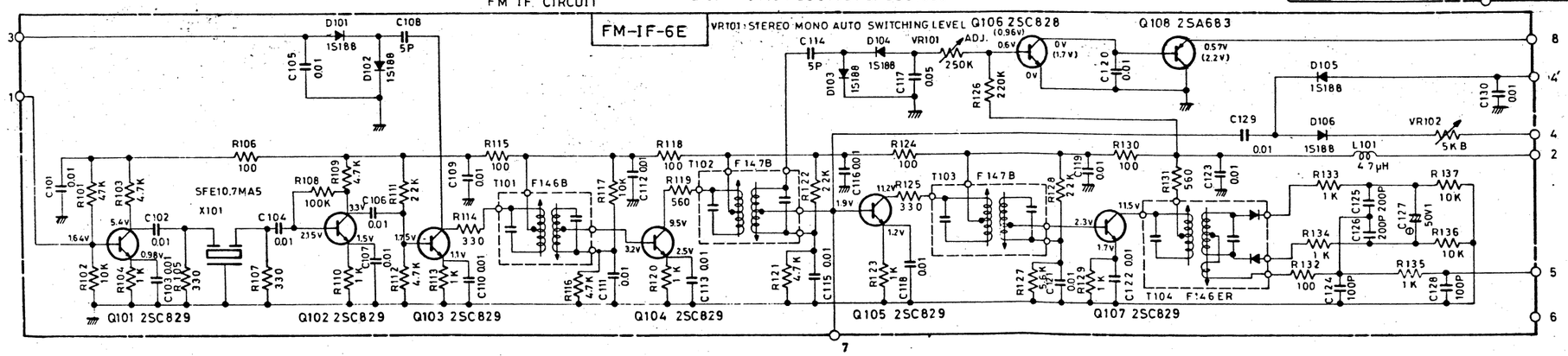
14 * 2 TONE CONTROL CIRCUIT



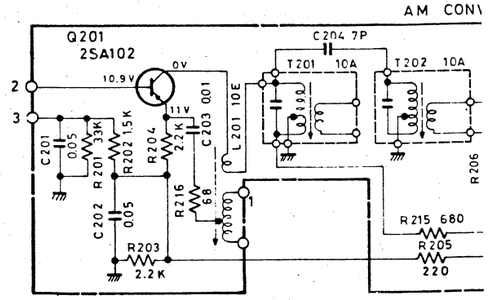
TP MPX CIRCUIT

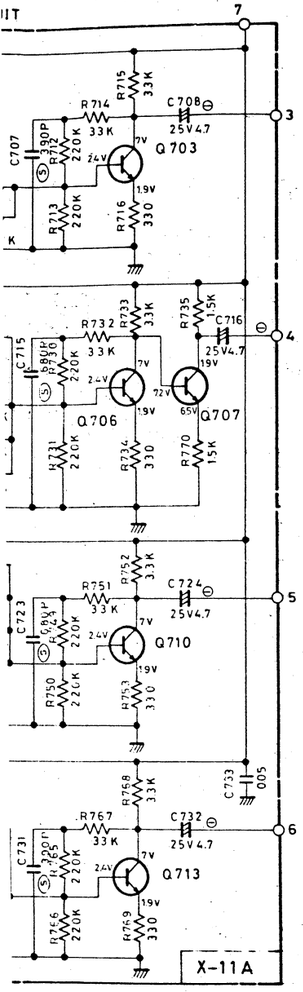


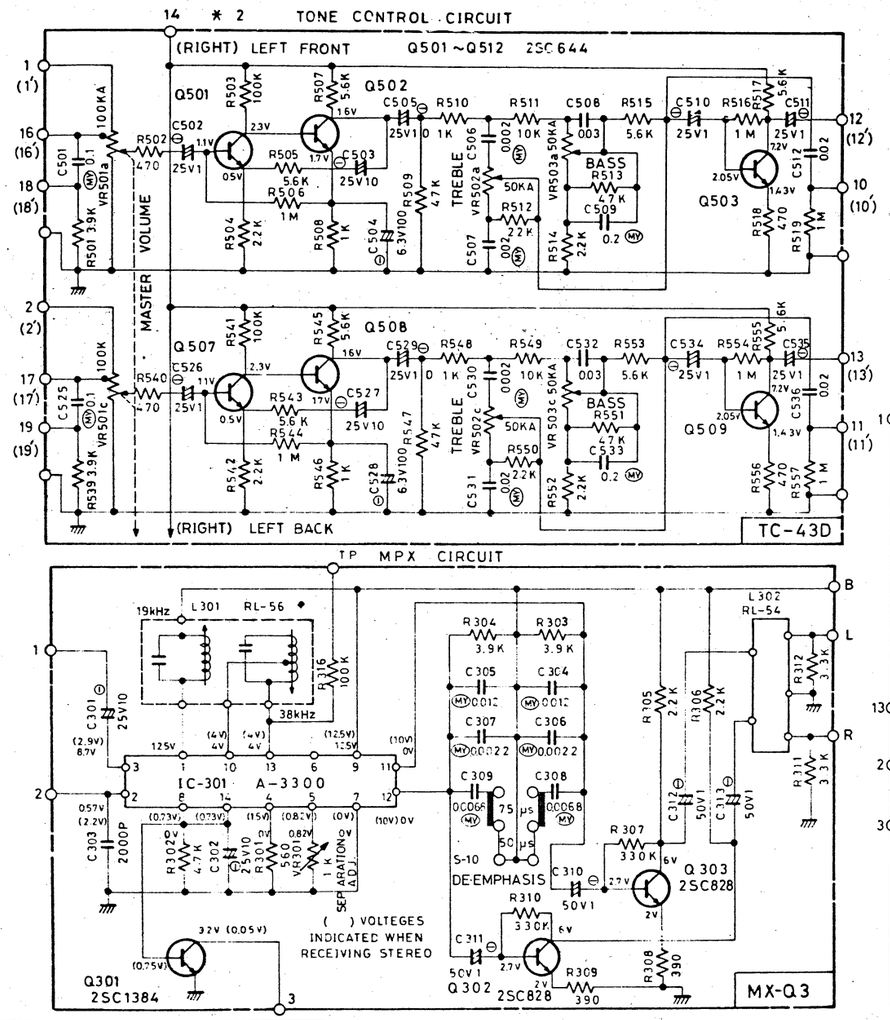
FM IF CIRCUIT

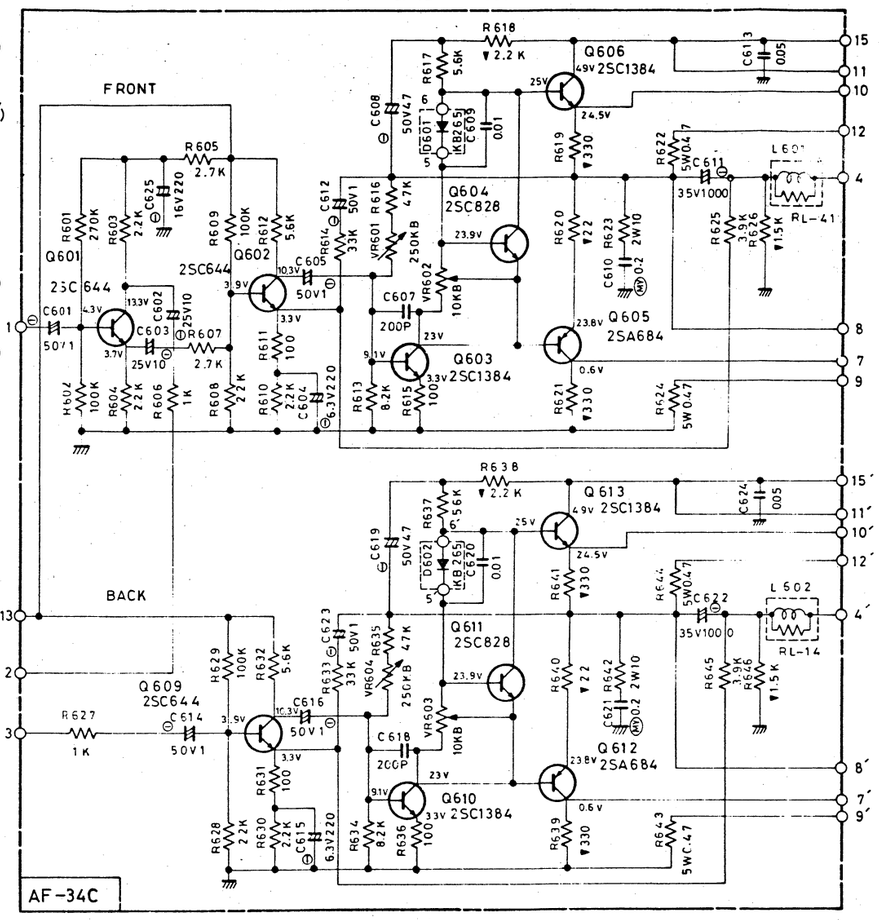


AM CONV

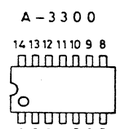




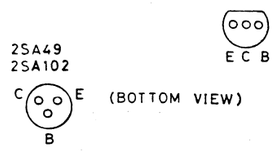


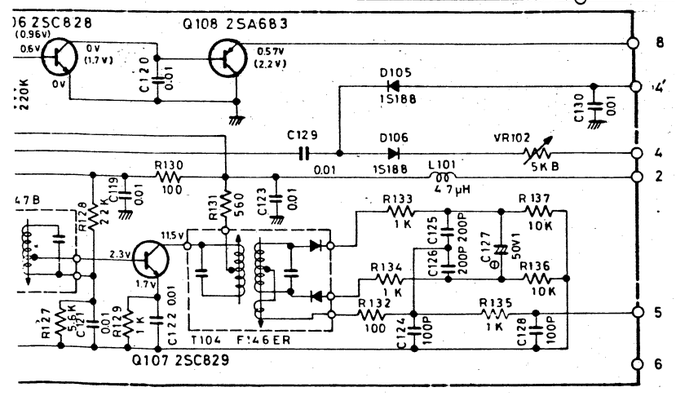


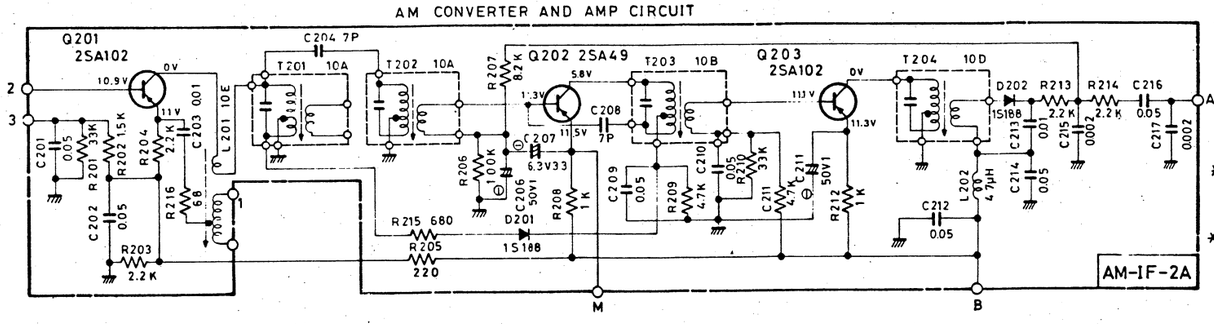
ITME	SCHEMATIC LOCATION (LAST)	
PR-3D	C	417
	R	422
X-11A	C	770
	R	732
TC-43D	C	548
	R	575
AF-34C	C	624
	R	646
FM-IF-6E	C	129
	R	137
AM-IF-2C	C	216
	R	216
MX-Q3	C	313
	R	316
MU-2	C	808
	R	809
X-28C	C	904
	R	906
B-21A	C	907
	R	907
B-18A	C	911
	R	914

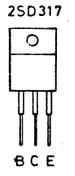


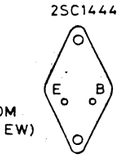
2SC644
2SC683
2SC684
2SC828
2SC829
2SC1327
2SC1328
2SC1384











* 1 RIGHT CH. MAIN AMPLIFIER IS NOT SHOWN. IT SAME AS LEFT CH.

* 2 ( ) RIGHT CH. TONE CONTROL CIRCUIT IS NOT SHOWN. IT SAME AS LEFT CH.

PARTS LIST

CHASSIS PARTS

Schematic Location	Part No.	Description
RESISTORS		
R001, 010	552010222	Carbon Film, 1K ±5%, 1/4W
R002, 003, R006, 007, R016, 017, R020, 021	552033322	Carbon Film, 33K ±5%, 1/4W
R004, 005, R008, 009, R012, 015, R018, 019, R022	552010422	Carbon Film, 100K ±5%, 1/4W
R011	552010122	Carbon Film, 100 ±5%, 1/4W
R013	552015222	Carbon Film, 1.5K ±5%, 1/4W
R014, 030, R031, 032, R033	552022322	Carbon Film, 22K ±5%, 1/4W
R023, 024, R025, 026	551033133	Composition, 330 ±10%, 1/2W
R027, 028	551056233	Composition, 5.6K ±10%, 1/2W
R029*	551022533	Composition, 2.2M ±10%, 1/2W
VR001,002, VR003,004	515321112	Variable, 100K, Level Control
*used only for the unit with voltage setting at 100–120V.		
CAPACITORS		
C001	440100835	Ceramic, 0.1mfd, 50V
C002	440151183	Ceramic, 150pF ±10%, 250V
C003	440501183	Ceramic, 500pF ±10%, 250V
C004	441301336	Ceramic, 3pF N5.6, 50V
C005, 006	400470459	Electrolytic, 4700mfd, 63V
L001	2200001121	Coil, RF choke, 47μH
L002	222391118	Coil, AM Antenna, Assembly
T001	205001336	Power Transformer, (100-117-220-240V)
TRANSISTORS AND DIODES		
Q001, 002, Q003, 004, Q005, 006, Q007, 008	301201141	2SC1444, Power Amp.

Schematic Location	Part No.	Description
D001	300111008	1S188, AM Meter Rect.
D601, 602	300212002	KB-265, Varistor
MISCELLANEOUS		
PL1, 2, 3, PL4, 5, 6, PL7	352063028	Lamp, 6.3V, 0.28A, Dial Light
PL8, 9, 10, PL11, 12, PL13, 14, PL15	351080015	Lamp, 8V, 0.15A, Func. Light
PL16, 17, PL18, 19, PL20	351140008	Lamp, 14V, 80mA, FM Stereo Ind., etc.
F001**	341220030	Fuse, 3A–3AG
F002, 003, F004, 005	341220020	Fuse, 2A–3AG
**When primary voltage setting at 220–240V, used 1.5A–3AG (341220015)		
M001	231310019	Meter, Tuning
S1, 2, 3, 4, S6, 7, 11	614071202	Push switch, 7 keys (1 set)
S8	601011236	Switch, Function Selector
S9	601011244	Switch, Mode Selector
	321304359	AM/FM Front end
	151691117	Dial Pointer w/lamp
	626110023	Jack, Headphones
	641400104	Output Terminal, 4P
	624100206	Pin jack, 6P
	624100208	Pin jack, 8P
	641200104	Antenna Terminal, 4P
	625001112	Din jack, 5P
	648211114	Bracket, Fuse
	648211115	Bracket, Dial Lamp
	648211116	AC Outlet

FM IF AMPLIFIER CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R101	552047322	Carbon Film, 47K ±5%, 1/4W
R102, 117, R136, 137	552010322	Carbon Film, 10K ±5%, 1/4W
R103, 109, R112, 116, R121	552047222	Carbon Film, 4.7K ±5%, 1/4W
R104, 110, R113, 120, R123, 129, R133, 134, R135	552010222	Carbon Film, 1K ±5%, 1/4W
R105, 107, R114, 125	552033122	Carbon Film, 330 ±5%, 1/4W
R106, 115, R118, 124, R130, 132	552010122	Carbon Film, 100 ±5%, 1/4W
R108	552010422	Carbon Film, 100K ±5%, 1/4W
R111, 122, R128	552022322	Carbon Film, 22K ±5%, 1/4W
R119, 131	552056122	Carbon Film, 560 ±5%, 1/4W
R126	552022422	Carbon Film, 220K ±5%, 1/4W
R127	552056222	Carbon Film, 5.6K ±5%, 1/4W
VR101	510502121	Potentiometer, 250K, switching level adj.
VR102	510502124	Potentiometer, 5K, meter level adj.
	CAPACITORS	
C101, 102, C103, 104, C105, 106, C107, 109, C110, 111, C112, 113, C115, 116, C118, 119, C120, 121, C122, 123, C129, 130	440100985	Ceramic, 0.01mfd, 250V

Schematic Location	Part No.	Description
C108, 114	440501388	Ceramic, 5pF ±0.5pF, 250V
C117	440500935	Ceramic, 0.05mfd, 50V
C124, 128	440101183	Ceramic, 100pF ±10%, 250V
C125, 126	440201183	Ceramic, 200pF ±10%, 250V
C127	402100749	Electrolytic, 1mfd, 50V
	TRANSFORMERS AND COILS	
T101	225501120	IFT, FM 10.7MHz, 2nd
T102, 103	225501121	IFT, FM 10.7MHz, 3rd, 4th
T104	225501122	IFT, FM Ratio Det.
L101	220001121	RF choke, 47μH
X101	229101134	Bandpass Filter, 10.70MHz (Red)
	TRANSISTORS AND DIODES	
Q101, 102, Q103, 104, Q105, 107	301201117	2SC829, FM IF Amp.
Q106	301201115	2SC828, Auto-switching Amp.
Q108	301001123	2SA683, Auto-switching Threshold
D101, 102, D103, 104, D105, 106	300111008	1S188, FM AGC, FM Meter Rect. etc.
	770101223	Pin, Terminal
	140200124	Printed Circuit Board "FM-IF-6E"
	141210143	FM IF Amp. Circuit Assembly

AM CONVERTOR AND IF AMP. CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R201, 210	552033322	Carbon Film, 33K ±5%, 1/4W
R202	552015222	Carbon Film, 1.5K ±5%, 1/4W
R203, 204, R213, 214	552022222	Carbon Film, 2.2K ±5%, 1/4W
R205	552022122	Carbon Film, 220 ±5%, 1/4W
R206	552010422	Carbon Film, 100K ±5%, 1/4W
R207	552082222	Carbon Film, 8.2K ±5%, 1/4W
R208, 212	552010222	Carbon Film, 1K ±5%, 1/4W
R209	552047222	Carbon Film, 4.7K ±5%, 1/4W
R215	552068122	Carbon Film, 680 ±5%, 1/4W
R216	552068022	Carbon Film, 68 ±5%, 1/4W
	CAPACITORS	
C201, 202, C209, 210, C212, 214, C216	440500935	Ceramic, 0.05mfd, 50V
C203, 213	440100985	Ceramic, 0.01mfd, 250V
C204, 208	440701388	Ceramic, 7pF ±0.5pF, 250V
C206, 211	402100749	Electrolytic, 1mfd, 50V
C207	402330609	Electrolytic, 33mfd, 6.3V
C214, 217	442201033	Ceramic, 0.002mfd ±10%, 50V
	TRANSFORMERS AND COILS	
T201, 202	225301121	IFT, AM 455KHz, 1st, 2nd
T203	225301122	IFT, AM 455KHz, 3rd
T204	225301124	IFT, AM 455KHz, Det.
L201	223301121	Coil, AM Local Oscillator
L202	220001121	RF choke, 47μH
	TRANSISTORS AND DIODES	
Q201, 203	301001124	2SA102, Convertor and 1st IF Amp.
Q202	301001111	2SA49, 2nd IF Amp.
D201, 202	300111008	1S188, AM Det., etc.
	770101223	Pin, Terminal
	140100122	Printed Circuit Board "AM-IF-2C"
	141110133	AM Conv. & IF Amp. Circuit Assembly

FM MPX DECODER CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R301	552056122	Carbon Film, 560 ±5%, 1/4W
R302	552047222	Carbon Film, 4.7K ±5%, 1/4W
R303, 304	552039222	Carbon Film, 3.9K ±5%, 1/4W
R305, 306	552022222	Carbon Film, 2.2K ±5%, 1/4W
R307, 310	552033422	Carbon Film, 330K ±5%, 1/4W
R308, 309	552039122	Carbon Film, 390 ±5%, 1/4W
R311, 312	552033222	Carbon Film, 3.3K ±5%, 1/4W
R313–315		Not used
R316	552010422	Carbon Film, 100K ±5%, 1/4W
VR301	510502119	Potentiometer, 1K, Separation Adj.
	CAPACITORS	
C301, 302	402100629	Electrolytic, 10mfd, 25V
C303	442201033	Ceramic, 0.002mfd ±10%, 50V
C304, 305	452120932	Mylar Film, 0.012mfd ±5%, 50V
C306, 307	452221032	Mylar Film, 0.0022mfd ±5%, 50V
C308, 309	452681032	Mylar Film, 0.0068mfd ±5%, 50V
C310, 311, C312, 313	402100749	Electrolytic, 1mfd, 50V
	COILS	
L301	225601129	MPX 19KHz/38KHz Tune
L302	228641113	38KHz Filter
	TRANSISTORS AND IC	
Q301	301201132	2SC1384, Stereo Indicator Threshold
Q302, 303	301201115	2SC828, Audio Amp.
IC301	303462145	LA-3300, MPX Decoder
S10	613000024	Switch, De-emphasis
	770101223	Pin, Terminal
	140400445	Printed Circuit Board "MX-Q3"
	141411432	MPX Decoder Circuit Assembly

EQUALIZER AMP. CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R401, 413	552047322	Carbon Film, 47K ±5%, 1/4W
R402, 409, R414, 419	552010222	Carbon Film, 1K ±5%, 1/4W
R404, 406, R410, 415, R420	552022322	Carbon Film, 22K ±5%, 1/4W
R405, 416	552056122	Carbon Film, 560 ±5%, 1/4W
R407, 418	552010322	Carbon Film, 10K ±5%, 1/4W
R408, 417	552010522	Carbon Film, 1M ±5%, 1/4W
R411, 421	552033422	Carbon Film, 330K ±5%, 1/4W
R412, 422	552033222	Carbon Film, 3.3K ±5%, 1/4W
	CAPACITORS	
C401, 405, C409, 414	402100629	Electrolytic, 10mfd, 25V
C402, 411, C418, 419	440501283	Ceramic, 50pF ±10%, 250V
C403, 412	440101183	Ceramic, 100pF ±10%, 250V
C404, 413	402330600	Electrolytic, 33mfd, 6.3V
C406, 415	442301033	Ceramic, 0.003mfd, ±10%, 50V
C407, 416	450150933	Mylar Film, 0.015mfd ±10%, 50V
C408, 417	402100749	Electrolytic, 1mfd, 50V
C410	412100539	Electrolytic, 100mfd, 35V
	TRANSISTORS	
Q401, 402, Q403, 404	301201134	2SC1327, Audio Amp.
	770101223	Pin, Terminal
	140500524	Printed Circuit Board "PR-3D"
	141510132	Equalizer Amp. Circuit Assembly

TONE CONTROL AMP. CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R501, 539	552039222	Carbon Film, 3.9K ±5%, 1/4W
R502, 518, R540, 556	552047122	Carbon Film, 470 ±5%, 1/4W
R503, 541	552010422	Carbon Film, 100K ±5%, 1/4W
R504, 514, R542, 551	552022222	Carbon Film, 2.2K ±5%, 1/4W
R505, 507, R515, 517, R543, 545, R553, 555	552056222	Carbon Film, 5.6K ±5%, 1/4W
R506, 516, R519, 544, R554, 557	552010522	Carbon Film, 1M ±5%, 1/4W
R508, 510, R546, 548	552010222	Carbon Film, 1K ±5%, 1/4W
R509, 513, R547, 552	552047322	Carbon Film, 47K ±5%, 1/4W
R511, 549	552010322	Carbon Film, 10K ±5%, 1/4W
R512, 550	552022322	Carbon Film, 22K ±5%, 1/4W
VR501	525121121	Variable, 100KAx4, Master Volume Cont.
VR502, 503	525101118	Variable, 50KAx4, Bass & Treble Cont.
	CAPACITORS	
C501, 525	450100833	Mylar Film, 0.1mfd ±10%, 50V
C502, 505, C510, 511, C526, 529, C534, 545	402100749	Electrolytic, 1mfd, 50V
C503, 527	402100629	Electrolytic, 10mfd, 25V
C504, 508	402100509	Electrolytic, 100mfd, 6.3V
C506, 530	450201033	Mylar Film, 0.002mfd ±10%, 50V
C507, 512, C531, 535	450200933	Mylar Film, 0.02mfd ±10%, 50V
C508, 532	450300933	Mylar Film, 0.03mfd ±10%, 50V
C509, 533	450200833	Mylar Film, 0.2mfd ±10%, 50V
	TRANSISTORS	
Q501, 502, Q503, 507, Q508, 509	301201114	2SC644, Audio Amp.
	770101223	Pin, Terminal
	140700741	Printed Circuit Board "TC-43"
	141710237	Tone Control Amp. Circuit Assembly

MAIN AMPLIFIER CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R601	552027422	Carbon Film, 270K ±5%, 1/4W
R602, 609, R629	552010422	Carbon Film, 100K ±5%, 1/4W
R603, 604, R610, 630	552022222	Carbon Film, 2.2K ±5%, 1/4W
R605, 607	552027222	Carbon Film, 2.7K ±5%, 1/4W
R606, 627	552010222	Carbon Film, 1K ±5%, 1/4W
R608, 628	552022322	Carbon Film, 22K ±5%, 1/4W
R611, 615, R631, 636	552010122	Carbon Film, 100 ±5%, 1/4W
R612, 617, R632, 637	552056222	Carbon Film, 5.6K ±5%, 1/4W
R613, 634	552082222	Carbon Film, 8.2K ±5%, 1/4W
R614, 633	552033322	Carbon Film, 33K ±5%, 1/4W
R616, 635	552047322	Carbon Film, 47K ±5%, 1/4W
R618, 638	551022233	Composition, 2.2K ±10%, 1/2W
R619, 621, R639, 641	551033133	Composition, 330 ±10%, 1/2W
R620, 640	551022033	Composition, 22 ±10%, 1/2W
R622, 624, R643, 644	554147973	MPC, 0.47 ±10%, 5W
R623, 642	554010053	Bath tub, 10 ±10%, 2W
R625, 645	552039222	Carbon Film, 3.9K ±5%, 1/4W
R626, 646	551015233	Composition, 1.5K ±10%, 1/2W
VR601, 603	510502127	Potentiometer, 250K, DC Balance Adj.
VR602, 604	510502126	Potentiometer, 10K, Idling Current Adj.

Schematic Location	Part No.	Description
	CAPACITORS	
C601, 605, C612, 614, C616, 623	402100749	Electrolytic, 1mfd, 50V
C602, 603	402100629	Electrolytic, 10mfd, 25V
C604, 615	402220509	Electrolytic, 220mfd, 6.3V
C607, 618	440201183	Ceramic, 200pF ±10%, 250V
C608, 619	402470649	Electrolytic, 47mfd, 50V
C609, 613, C620, 624	440100985	Ceramic, 0.01mfd, 250V
C610, 621	450200833	Mylar Film, 0.2mfd ±10%, 50V
C611, 622	402100439	Electrolytic, 1000mfd, 35V
C625	402220519	Electrolytic, 220mfd, 16V
	TRANSISTORS	
Q601, 602, Q609	301201114	2SC644, Audio Amp.
Q603, 606, Q610, 613	301201132	2SC1384, Predriver and Driver
Q604, 611	301201115	2SC828, Temperature Compensator
Q605, 612	301001123	2SA684, Driver
L601, 602	220401120	Coil, Anti-plastic
	770101223	Pin, Terminal
	140600656	Printed Circuit Board "AF-34"
	141610238	Main Amp. Circuit Assembly

SQ MATRIX 4-CH. DECODER CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R701, 717, R736, 754	552056422	Carbon Film, 560K ±5%, 1/4W
R702, 718, R737, 755	552010522	Carbon Film, 1M ±5%, 1/4W
R703, 704, R719, 720, R738, 739, R756, 757	552047122	Carbon Film, 470 ±5%, 1/4W
R705, 721, R735, 740, R758, 770	552015222	Carbon Film, 1.5K ±5%, 1/4W
R706, 722, R741, 759	552012322	Carbon Film, 12K ±5%, 1/4W

Schematic Location	Part No.	Description
R707, 709, R723, 724, R725, 742, R743, 744, R760, 762	552068222	Carbon Film, 6.8K ±5%, 1/4W
R708, 761	552056222	Carbon Film, 5.6K ±5%, 1/4W
R710, 764	552047322	Carbon Film, 47K ±5%, 1/4W
R711, 712, R713, 730, R731, 749, R750, 763, R765, 766	552022422	Carbon Film, 220K ±5%, 1/4W
R714, 732, R751, 767	552033322	Carbon Film, 33K ±5%, 1/4W

Schematic Location	Part No.	Description
R715, 733, R752, 768	552033222	Carbon Film, 3.3K ±5%, 1/4W
R716, 734, R753, 769	552033122	Carbon Film, 330 ±5%, 1/4W
R726, 729, R745, 747	552015422	Carbon Film, 150K ±5%, 1/4W
R727, 728, R746, 748	552068322	Carbon Film, 68K ±5%, 1/4W
	CAPACITORS	
C701, 705, C706, 708, C709, 713, C714, 716, C717, 721, C722, 724, C725, 729, C730, 732	402470729	Electrolytic, 4.7mfd, 25V
C702, 726	452470932	Mylar Film, 0.047mfd ±5%, 50V
C703, 727	452821032	Mylar Film, 0.0082mfd ±5%, 50V

Schematic Location	Part No.	Description
C704, 728	452180932	Mylar Film, 0.018mfd ±5%, 50V
C707, 731	454391133	Polystryrene Film, 390pF ±10%, 50V
C710, 718	452220832	Mylar Film, 0.22mfd ±5%, 50V
C711, 719	452390932	Mylar Film, 0.039mfd ±5%, 50V
C712, 720	452680932	Mylar Film, 0.068mfd ±5%, 50V
C715, 723	454681133	Polystryrene Film, 680pF ±10%, 50V
C733	440500933	Ceramic, 0.05mfd, 50V
	TRANSISTORS	
Q701, 702, Q703, 704, Q705, 706, Q707, 708, Q709, 710, Q711, 712, Q713	301201134	2SC1327 or 2SC1328 (#301201147) Phase Sifter
	770101223	Pin, Terminal
	140800138	Printed Circuit Board "X-11"
	141810564	SQ 4-ch. Decoder Circuit Assembly

FM MUTING CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R801, 804	552010222	Carbon Film, 1K ±5%, 1/4W
R802	552047322	Carbon Film, 47K ±5%, 1/4W
R803, 809	552010322	Carbon Film, 10K ±5%, 1/4W
R805, 806, R808	552033222	Carbon Film, 3.3K ±5%, 1/4W
R807	552022322	Carbon Film, 22K ±5%, 1/4W
VR801	510502125	Potensiometer, 10K, Muting Level Adj.
	CAPACITORS	
C801, 803, C804, 805	440100985	Ceramic, 0.01mfd, 250V
C802	440501283	Ceramic, 50pF ±10%, 250V

Schematic Location	Part No.	Description
C806, 807	402100749	Electrolytic, 1mfd, 50V
C808	402100629	Electrolytic, 10mfd, 25V
C809	441301336	Ceramic, 3pF N5.6, 50V
	TRANSISTORS AND DIODES	
Q801, 802	301201117	2SC829, Carrier Amp., Muting Threshold
Q803	301201132	2SC1384, Muting Threshold
D801, 802	300212004	KB-269, Varistor
L801	226501115	Coil, Muting, 10.7MHz Tune
	7701012223	Pin, Terminal
	140800137	Printed Circuit Board "MU-2"
	141810563	Muting Circuit Assembly

4-CH. INDICATOR CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R901, 902, R904	552010322	Carbon Film, 10K ±5%, 1/4W
R903	552010422	Carbon Film, 100K ±5%, 1/4W
R905	552068322	Carbon Film, 68K ±5%, 1/4W
R906	552056222	Carbon Film, 5.6K ±5%, 1/4W
	CAPACITORS	
C901, 902, C903	402100749	Electrolytic, 1mfd, 50V

Schematic Location	Part No.	Description
C904	440100835	Ceramic, 0.1mfd, 50V
	TRANSISTORS AND DIODES	
Q901, 902	301201115	2SC828,
Q903	301301122	2SD317,
D901, 902	300111008	1S188,
	770101223	Pin, Terminal
	140800156	Printed Circuit Board "X-28"
	141810568	4-ch. Indicator Circuit Assembly

RECTIFIER CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTOR	
R907	551047233	Composition, 4.7K ±10%, 1/2W
	CAPACITORS	
C905	402100439	Electrolytic, 1000mfd, 35V
C906, 907	440500935	Ceramic, 0.05mfd, 50V

Schematic Location	Part No.	Description
	TRANSISTOR AND DIODES	
Q904	301301122	2SD317, Stabilizer
D903, 905	300919010	ESACO-2N, Rectifier
D904, 906	300919009	ESACO-2C, Rectifier
D907	300313010	BZ-310, Zener, 31V
	770101223	Pin, Terminal
	140800157	Printed Circuit Board "B-21"
	141810570	Rectifier Circuit Assembly

DISTRIBUTING CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R908	551068033	Composition, 68 ±10%, 1/2W
R909	551022133	Composition, 220 ±10%, 1/2W
R910, 911 R912	551010233	Composition, 1K ±10%, 1/2W
R913, 914	551082133	Composition, 820 ±10%, 1/2W
R915	551027133	Composition, 270 ±10%, 1/2W

Schematic Location	Part No.	Description
	CAPACITORS	
C908, 909 C910	402100439	Electrolytic, 1000mfd, 35V
C911	402470519	Electrolytic, 470mfd, 16V
L901	220001121	Coil, RF choke, 47μH
D908	300313004	Diode, BZ-120, Zener 12V
	770101223	Pin, Terminal
	140800149	Printed Circuit Board "B-18"
	141810569	Distributing Circuit Assembly

QUAD – STEREO SWITCH CIRCUIT BOARD

Schematic Location	Part No.	Description
S5	613000021	Switch, Quad – Stereo (BTL)
	761911133	Spacer, switch Mtg.
	770101223	Pin, Terminal

Schematic Location	Part No.	Description
	140800155*1	Printed Circuit Board "X-25"
	141810567*2	Quad – Stereo Switch Circuit Assembly

NOTES: *1 and *2 for the unit with serial No. from Ⓕ40661 on and Ⓖ07120 on are as follows.

*1: 140800158 Printed Circuit Board "X-33"

*2: 141810572 Quad – Stereo Switch Circuit Assembly

DERIVED CIRCUIT BOARD

Schematic Location	Part No.	Description
	RESISTORS	
R916, 923	552010522	Carbon Film, 1M ±5%, 1/4W
R917, 918, R921, 924, R925, 928	552056222	Carbon Film, 5.6K ±5%, 1/4W
R919, 920, R926, 927	552010322	Carbon Film, 10K ±5%, 1/4W
R922	552015222	Carbon Film, 1.5K ±5%, 1/4W
R929, 930	552010422	Carbon Film, 100K ±5%, 1/4W
	CAPACITORS	
C912, 914, C916, 918	402100749	Electrolytic, 1mfd, 50V

Schematic Location	Part No.	Description
C913, 917	440100985	Ceramic, 0.01mfd, 250V
C915	402100539	Electrolytic, 100mfd, 35V
	TRANSISTORS	
Q905, 906, Q907	301201114	2SC644
	770101223	Pin, Terminal
	140800159	Printed Circuit Board "X29"
	141810573	Derived Circuit Assembly

NOTE: These parts are used for the unit with serial No. from Ⓕ40661 on and Ⓖ07120 on.